Engineering

Desk 4

BIBLIOGRAPHY OF Technical Reports

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Vol. 20, No. 4. October 2, 1953

APPAREL

Case study data on productivity and factory performance: Men's bib overalls and men's work jackets. U. S. Bureau of Labor Statistics. Jan 1952. 59p photos, drawings, diagr, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109985

Prepared for the Mutual Security Agency Productivity and Technical Assistance Division.
1. Clothing, Work - Manufacture 2. Overalls - Manufacture 3. Jackets, Work - Manufacture.

Case study data on productivity and factory performance: Men's dress shirts. (Based on reports submitted by 16 selected plants). U. S. Bureau of Labor Statistics. Jul 1951. 85p photos, drawings, diagrs, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109994

Prepared for the Economic Cooperation Administration, Technical Assistance Division.
1. Shirts - Manufacture.

Case study data on productivity and factory performance: Men's Goodyear welt dress shoes. (Based on reports submitted by 13 selected plants). U. S. Bureau of Labor Statistics. Aug 1951. 74p tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109990

A preliminary edition of this report, for technical criticism, was dated Mar 1951. Prepared for the Economic Cooperation Administration, Technical Assistance Division.
1. Shoe industry 2. Shoes - Manufacture.

Case study data on productivity and factory performance: Men's work pants. (Based on reports submitted by 11 selected plants). U. S. Bureau of Labor Statistics. Dec 1951. 67p photos, diagrs, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109992

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.
1. Trousers, Work - Manufacture 2. Clothing, Work - Manufacture.

Case study data on productivity and factory performance: Men's work pants, supplement. List of machinery used. U. S. Bureau of Labor Statistics. Nov 1952. 14p tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109992s

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.
1. Trousers, Work - Manufacture - Machinery
2. Clothing, Work - Manufacture - Machinery
3. Machines, Garment making.

Case study data on productivity and factory performance: Men's work shirts. (Based on reports submitted by 8 selected plants). U. S. Bureau of Labor Statistics. Nov 1951. 59p photos, drawings, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109989

A preliminary edition of this report, for technical criticism, was dated July, 1951. Prepared for Mutual Security Agency, Productivity and Technical Assistance Division.
1. Shirts - Manufacture.

Case study data on productivity and factory performance: Men's winter suits and topcoats. (Based

on reports submitted by 10 selected winter suit plants and 6 selected topcoat plants). U. S. Bureau of Labor Statistics. Jan 1953. 270p photos, diagr, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 110452

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.
1. Clothing industry 2. BLS R 4.

Case study data on productivity and factory performance: Women's dress shoes, cement process. U. S. Bureau of Labor Statistics. Nov 1951. 56p photos, diagr, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109987

Prepared for Mutual Security Agency, Productivity and Technical Assistance Division.
1. Shoes, Women's - Manufacture.

CHEMICALS AND ALLIED PRODUCTS

Drugs and Pharmaceuticals

Further investigations on the use of heparin in the treatment of experimental frostbite, by R. B. Lewis and P. W. Moen. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1953. 10p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109925

The extent of muscle and skin necrosis was determined in 87 of 311 heparinized rabbits following exposure of a hind leg to cold alcohol at either -12° or -15° C. for 30 minutes in thirteen separate experiments. The results were compared to those from 118 similarly exposed but nonheparinized animals. The incidence and extent of gangrene were not less in heparinized animals, even though blood coagulation times were kept at or above 30 minutes during the treatment period. AAF SAM Proj 21-1202-0001, Report no. 2.

Plastics and Plasticizers

Foaming-in-place of alkyd resins for sandwich radomes, by H. A. Pace. Goodyear Aircraft Corporation, Akron, Ohio. Under Contract no. W33-038-ac-15228. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Final report. Dec 1949. 71p photos, diagrs, graphs Microfilm $3.50, Photostat $10.00. PB 110498

GER 4097. Includes Addendum no. 1, Mar 1950.
1. Radar - Domes - Materials 2. Plastics, Laminated - Fillers 3. Foams, Alkyd-isocyanate 4. Instruments, Measuring - Thermotechnical.

Supplement I to final engineering report. Oct 1950. 18p table Microfilm $1.75, Photostat $2.50. PB 110498s

GER 2423.

Radome materials research and fabrication development service. Goodyear Aircraft Corporation, Akron, Ohio. Final engineering report on Contract no. W33-038-ac-15228, prepared by J. K. Burkley, E. Duplaga, H. A. Pace, B. D. Raffel. May 1948. 129p photos, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $5.00, Photostat $16.25. PB 110497

GER 1656. For supplement see PB 107372. For interim reports see PB 104464-104471.
1. Radar - Domes - Materials 2. Coatings, Protective - Erosion resistance 3. Foams, Chemical - Electrical properties 4. Erosion - Tests 5. Plastics, Laminated - Tests 6. Plastics, Laminated - Fillers.

Chemical Engineering and Equipment

Chemical apparatus in the U.S.A. Report by a group of European experts. Organisation for European Economic Co-operation, Paris. 1952. 214p drawings, diagrs (3 col.) graphs (1 fold) tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $6.00. PB 110622

Technical assistance mission no. 23.
1. Chemical engineering 2. Chemical industries 3. Chemical plants 4. Chemical research 5. Laboratories, Chemical - Instruments and apparatus 6. OEEC TAR 23.

Positive filter type of infrared gas analyzer, by Myron A. Elliott. U. S. Naval Research Laboratory. Apr 1949. 15p photos, drawings, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109797

Description of a new type of sensing unit for detection of infrared absorption in the positive filter type of gas analyzer. Method utilizes a jet-vane system in conjunction with a photoelectric cell and a suitable amplifier for detecting the pressure unbalance between the two positive filter detector cells. The construction of a working model and the results of preliminary tests on its use for carbon dioxide analysis are also described. NRL C-3449.

Alpha, beta-unsaturated ketones from methyl cyclopropyl ketone by condensation reactions with benzaldehyde, acetophenone and isobutyraldehyde, by Irving Miller. Jun 1950. 50p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 110504

Investigation was made of the methods used to produce alpha beta-unsaturated ketone and of the analysis conducted on recovered reaction products. The theory and mechanism of preparing the compound are discussed, and the experimental reactions investigated are described. Thesis-Rensselaer Polytechnic Institute.

Attempted synthesis of N-substituted amides, by Arthur J. Olivet, Jr. Jun 1950. 43p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 110503

In an attempt to support or disprove the mechanism of the synthesis of substituted amides upon water hydrolysis of a reaction mixture of nitriles and active alkenes in concentrated sulfuric acids, and the synthesis of N-alkyl formamides upon water hydrolysis of a reaction mixture of hydrogen cyanide and tertiary alcohols in concentrated sulfuric acid, as postulated by Ritter, Minieri, and Kalish, the synthesis of N-substituted amides was attempted using alkyl sulfates as starting products. The reaction was accomplished with a variety of nitriles and tertiary alcohols, as well as with nitriles and tertiary chloride. Thesis-Rensselaer Polytechnic Institute.

Centrifugal distortion in asymmetric top molecules. Massachusetts Institute of Technology. Research Laboratory of Electronics. Contracts no. W36-039-sc-32037 and DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

I: Ordinary formaldehyde, $H_2C^{12}O$, by R. B. Lawrance and M.W.P. Strandberg. Oct 1950. 17p diagr, graphs, tables Microfilm $1.75, Photostat $2.50. PB 110534

1. Formaldehyde - Molecular structure 2. Molecules - Rotation 3. MIT RLE TR 177.

II: HDS, by R. E. Hillger and M.W.P. Strandberg. Oct 1950. 16p diagrs, tables Microfilm $1.75, Photostat $2.50. PB 110537

A perturbation method for relating the theory of centrifugal distortion in asymmetric top molecules to observed microwave Q branch, a- or c-type transitions, is presented. The inertia defect and distortion constants are calculated. MIT RLE TR 180.

Development of a modified helium cryostat of the Collins type, by S. C. Collins and L. B. Smith. Massachusetts Institute of Technology. Laboratory for Insulation Research. Oct 1951. 21p photos, drawings, diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110641

A modified helium cryostat of the Collins type is described. Its final performance is not superior to the present day commercial liquefiers, but a new type of crosshead, a continuous speed control, and a number of other features represent an advancement in design. Contract N5ori-07801, NR-074-041. MIT LIR TR 48.

Extension of the microwave spectrum of ND_2H, by K. A. Sawyer and J. D. Kierstead. Massachusetts Institute of Technology. Research Laboratory of Electronics. Feb 1951. 6p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110545

Extension of the investigation of the deuteroammonias down to the 4,000 Mc/sec region produced many inversion-rotation spectrum lines of ND_2H. This search was conducted to complete the investigation carried on by Weiss in the frequency range from 6,500-80,000 Mc/sec. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 188.

High frequency gas discharge breakdown in hydrogen, by A. D. MacDonald and Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1949. 12p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110520

Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Hydrogen - Cross sections 2. Hydrogen - Electric properties 3. Gases - Breakdown theory 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 133.

Infrared-sensitive calcium silicate phosphors, by James H. Schulman and Robert J. Ginther. U. S. Naval Research Laboratory. Mar 1949. 8p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109861

Description of preparation and infrared storage properties of two silicate phosphors, $CaSiO_3$:Pb and $CaSiO_3$:(Pb, Mn), which are extremely resistant to chemical attack by oxygen, carbon dioxide, or moisture. These phosphors store energy well, and emit it as visible light upon exposure to infrared radiation of about 1 micron wavelength. NRL P-3429.

Investigations of pulsed second sound in liquid helium II, by J. R. Pellam. Massachusetts Institute of Technology. Research Laboratory of Electronics. Nov 1948. 23p photos, drawings, diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110561

The advantages of pulsing are enumerated for the particular case of second sound. The analogous electrical circuit is formulated for the geometry involved. Data is recorded photographically and examples for several cases presented. The previously known conversion between second sound and classical sound in helium vapor is examined quantitatively. A third conversion, probably occurring upon reflection from a boundary, is illustrated. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 89.

Kinetics of the isocyanide reaction and instrumental methods, by Joseph Anthony Kardys. Jun 1950. 81p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 110507

The bromo-electrometric titration method was described as the most successful for determinations of aromatic amines. Rate determining reactants in the isocyanide reaction were examined. An analytical method was developed to determine amines potentiometrically. A method to study potentiometrically diazotization kinetics is suggested. Development of an analytical method to determine amines with the ultraviolet spectrophotometer is discussed. Suggestions are made for three component studies of sodium hydroxide, methyl alcohol and dioxane solutions as well as a possible method to increase the yield of isocyanide. Thesis-Rensselaer Polytechnic Institute.

Mechanical properties of alkali-halide crystals (NaCl, KBr, KCl), by J. K. Galt. Massachusetts Institute of Technology. Research Laboratory of Electronics. Sep 1947. 25p photos, drawing, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109972

The pulse method has been applied to measure mechanical properties of NaCl, KBr and KCl at 10 and 30 Mc/sec. The elastic constants of KBr have been measured in the low-temperature region. An upper limit for the attenuation of shear waves in the 110 and 100 directions has been obtained. The strain-optical constants have been measured by a traveling-wave method suggested by Mueller. Contract W36-039-sc-32037. MIT RLE TR 45.

Microwave spectra of CH_3NCS and CH_3SCN, by C. L. Beard and B. P. Dailey. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1948. 18p diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110555

Experimental techniques used and the interpretation of the spectra of these molecules are discussed. A theoretical spectrum for CH_3NCS has been set up and the complicating effects of the removal of degeneracies by asymmetry and by an external electric field, of centrifugal distortion, of the presence of excited vibrational states, of internal rotation, of isotopic varieties of the molecule, of nuclear quadrupole coupling, and of other allowed asymmetric rotor transitions are calculated. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 79.

Microwave spectrum of carbonyl selenide, by M.W.P. Strandberg, T. Wentink, Jr. and A. G. Hill. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1948. 15p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110554

1. Carbonyl selenide - Spectrographic analysis 2. SIG Contract W36-039-sc-32037 3. MIT RLE TR 78.

Microwave spectrum of phosphine, arsine and stibine, by C. C. Loomis and M.W.P. Strandberg. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jul 1950. 21p diagr, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110515

Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Arsine - Spectrographic analysis 2. Phosphine - Spectrographic analysis 3. Stibine - Spectrographic analysis 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 167.

On the magnetic moments of C^{13}, F^{19}, Ti^{203} and Ti^{205}, by H. L. Poss. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jul 1948. 13p table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110551

1. Neutrons - Magnetic moments 2. Carbon - Isotopes - Magnetic moments 3. Fluorine - Isotopes - Magnetic moments 4. Titanium - Isotopes - Magnetic moments 5. SIG Contract W36-039-sc-32037 6. MIT RLE TR 74.

Organic analytical reagents for mercury analysis, by John U. Shepardson. Jun 1950. 139p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $5.50, Photostat $17.50. PB 110473

The properties of dithizone (diphenylthiocarbazone) have been studied and eight modified analogues of dithizone have been synthesized with the aim of overcoming the defects of this reagent. A method for the infrared identification of thiocarbazones has been developed based on the characteristic absorption of the amine and azo groups. The pH-extraction equilibrium of mercuric dithizonate has been studied over a wide pH range, resulting in the proposal of a possible method for the separation and determination of mercury. A method is given for the determination of traces of mercury in wire insulation. Thesis-Rensselaer Polytechnic Institute.

Peptide bond synthesis by bacterial preparations, by Theodore Richard Spiers. May 1950. 51p photos, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 110472

An intensive study of the synthesis of peptides by bacterial enzyme extracts was conducted as a contribution toward an understanding of the process by which peptides are synthesized and in turn transformed into proteins. Experimental results confirmed the possibility of synthesizing some peptides from simple amino acids, glycine, and analine. An enzyme extract prepared from Aerobactor aerogenes gave the most favorable results. Detailed instructions for future research are given. Thesis-Rensselaer Polytechnic Institute.

Pressure dependence of second-sound velocity in liquid helium II, by R. D. Maurer and Melvin A. Herlin. Massachusetts Institute of Technology. Research Laboratory of Electronics. Oct 1950. 7p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110536

The velocity of second sound as a function of pressure and temperature has been measured to 0.95°K by a pulse method. The quantitative dependence of the rise in velocity upon pressure is found to support the role of the phonons in contributing to the normal fluid flow alone. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 179.

Production of phosphorus 32 from pile-irradiated sulphur, an A.E.R.E. report, compiled and edited by W. J. Arrol and F. Hudswell. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Oct 1952. 20p drawings Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.75. PB 110613

HD 805. S. O. code no. 70-674-1-13. Cover date is 1953.
1. Phosphorus, Radioactive - Separation from radioactive sulfur 2. Sulfur, Radioactive - Radioactive phosphorus separation 3. Atomic power - Research - Gt. Brit. 4. AERE I/R 1033.

Rapid method for the semi-quantitative spectrographic analysis of a wide range of materials, an A.E.R.E. report, by F. T. Birks. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. May 1953. 6p drawing, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.35. PB 110612

HD. 907. S. O. code no. 70-674-1-39.
1. Spectrographic analysis - Methods - Gt. Brit. 2. Neutron fluxes - Measurement - Gt. Brit. 3. Barium chloride - Spectrographic analysis - Gt. Brit. 4. Ferric sulphate - Spectrographic analysis - Gt. Brit. 5. Lithium carbonate - Spectrographic analysis - Gt. Brit. 6. Potassium bisulphate - Spectrographic analysis - Gt. Brit. 7. Sodium nitrate - Spectrographic analysis - Gt. Brit. 8. Atomic power - Research - Gt. Brit. 9. AERE C/R 1177.

Reduction of selected nitriles with lithium aluminum hydride, by Henry P. Sorell. Jan 1950. 76p drawing, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.50, Photostat $10.00. PB 110471

An investigation was made to study the reduction of nitriles by lithium aluminum hydride with the purpose of outlining future work on the stability of aldimines; the preparation of pyrrolines unsubstituted in the alpha position; to examine the possibility of using lithium aluminum hydride as a selective reducing agent and hence greatly increasing its value as a tool in synthetic work, as well as to gain practical experience in the field of chemical research. Thesis-Rensselaer Polytechnic Institute. Some pages may not reproduce well.

Rotational absorption spectrum of OCS, by M. W.P. Strandberg, T. Wentink, Jr. and R. L. Kyhl. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1948. 18p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109978

1. Carbonyl sulfide - Spectrographic analysis 2. Spectroscopes, Microwave - Design 3. Stark effect 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 59.

Structure and dipole moment of isothiocyanic acid, by C. L. Beard and B. P. Dailey. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1949. 15p diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110576

"Thiocyanic acid" in the vapor state has been found to be at least 95 percent HNCS. From an analysis of the microwave rotational spectrum the following bond distances and bond angle were determined rH-N = 1.01 Å, rN-C = 1.218 Å, rC-S =

1.557 Å, H-N-C angle 136°. Analysis of the Stark spectrum indicates that the component of dipole moment along the molecular figure axis is 1.72 D. Stark components from transitions forbidden in the zero-field spectrum have been observed. Contract no. W36-039-sc-32037. MIT RLE TR 112.

Svaveltrioxid bildningen i angpannor (Formation of SO_3 in steam boilers), by Torsten Widell. Translated by Mr. Martensson. Jun 1953. 8p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109903

Translated from Teknisk Tidskrift, 23 Dec 1952, p. 1095-1096.
1. Sulfur trioxide - Production - Sweden 2. Steam boilers, Marine - Sulfur trioxide formation - Sweden 3. NAVSHIPS T 528.

Synthesis of substituted butyronitriles, by Joseph F. Marcelli. Jan 1950. 30p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110500

An investigation was conducted on the synthesis of certain derivatives of aa-diphenyl-butyronitrile. Three new nitriles were synthesized: aa-diphenyl-v-bromobutyronitrile, aa-diphenyl-v-chlorobutyronitrile, and aa-diphenyl-v-vinyloxybutyronitrile. Attempts were made to synthesize aa-diphenyl-v-aminobutyronitrile and aa-diphenyl-v-hydroxybutyronitrile by alkylation with aziirane and oxirane, respectively. The conditions were determined so that diphenyl-acetonitrile could be alkylated by the method of Knowles. Thesis-Rensselaer Polytechnic Institute.

Ultrasonic measurements on single crystals, by H. B. Huntington. Massachusetts Institute of Technology. Research Laboratory of Electronics. Mar 1947. 22p diagr, graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109953

1. Crystals, Alkali halide - Mechanical properties - Measurement 2. Crystals, Copper - Mechanical properties - Measurement 3. Rochelle salt - Mechanical properties - Measurement 4. Ultrasonic testing 5. SIG Contract W36-039-sc-32037 6. MIT RLE TR 10.

Wave transmission and reflection phenomena in liquid helium II, by John R. Pellam. Massachusetts Institute of Technology. Research Laboratory of Electronics. Nov 1947. 18p diagrs, graph Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109975

1. Waves, Supersonic - Absorption in liquids 2. Helium, Liquid - Acoustic properties 3. Waves, Supersonic - Reflection - Theory 4. Waves, Supersonic - Transmission - Theory 5. SIG Contract W36-039-sc-32037 6. MIT RLE TR 51.

DETERIORATION STUDIES

Effects of moisture and fungus upon electrical insulating material-a laboratory method, by J. M. Leonard and C. E. Patouillet. U. S. Naval Research Laboratory. Apr 1949. 11p diagr, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109863

A laboratory method applicable to small items is proposed for assessing the respective importances of mold and moisture as agents of deterioration. Special advantages of this method are the substitution of soap and water cleaning in place of drastic sterilization procedures, and the use of sterilized inoculum as a device to validate the controls. Data on the effects of moisture and fungus upon radio hookup wire are presented. NRL C-3452.

Research dealing with the weathering of cellulosic materials. Texas. University. Plant Research Institute, Austin, Texas. Quarterly progress report no. 1 under Contract no. AF33(616)-4. Feb 1952. 5p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110474

A separation of mycelium and cellulose has been effected in a satisfactory manner. The procedure involves the preparation of cellulose triacetate, dispersing it in an organic solvent, and then regenerating it via careful saponification. Sugar acetates have been prepared wherein the carbonyl groups are not bound. An apparatus and procedure have been developed from the determination of molecular weights. This is used in instances where melting point data cannot be used for identification purposes and in conjunction with elementary analysis of products involved in this study. Some pages may not reproduce well.

ELECTRICAL MACHINERY

Communication Equipment

Amplifiers with prescribed frequency characteristics and arbitrary bandwidth, by John G. Linvill. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jul 1950. 62p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 110518

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Amplifiers - Design 2. Amplifiers - Mathematical analysis 3. Amplifiers - Noise 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 163.

Application of statistical methods to communication problems, by Y. W. Lee. Massachusetts Institute of Technology. Research Laboratory of Electronics. Sep 1950. 41p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 110538

The basic ideas and tools in the statistical theory of communication are discussed. The methods of the theory in the formulation of some important communication problems are outlined. Some techniques which have been developed for application to practical problems, and certain laboratory results in support of the theory are described. To indicate the possibility of practical application, primarily with respect to improvement of signal-to-noise ratio, experimental results are presented. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 181.

Case study data on productivity and factory performance: Radio and television manufacturing. (Based on reports submitted by 16 selected plants). U. S. Bureau of Labor Statistics. Feb 1952. 64p photos, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 109983

Prepared for Mutual Security Agency, Productivity and Technical Assistance Division.
1. Television - Receivers - Manufacture 2. Radio receivers - Manufacture.

Experimental study of statistical characteristics of filtered random noise, by Nic Knudtzon. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jul 1949. 39p photos (1 fold), diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 110578

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Communications - Theory 2. Noise, Random - Mathematical analysis 3. Rayleigh principle (Mathematics) 4. Linear systems - Computing methods 5. SIG Contract no. W36-039-sc-32037 6. MIT RLE TR 115.

Flux-preset high-speed magnetic amplifiers, by C. B. House. U. S. Naval Research Laboratory. Jun 1953. 19p diagrs, graphs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.50. PB 111189

A general circuit for half-cycle-response magnetic amplifiers was developed from the postulation that the average current delivered to the load is controlled solely by the flux state of the core at the beginning of the gating cycle. A method was then evolved to preset the flux to any desired level during the half cycle of supply voltage immediately preceding the gating cycle. Comparative results are obtained when different types of core materials and rectifiers are used. NRL R 4172.

Interference in frequency-modulation reception, by J. Granlund. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jan 1949. 80p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.50, Photostat $10.00. PB 109969

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Frequency modulation - Research 2. Radio frequencies - Modulation 3. Radio interference - Theory 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 42.

Low-frequency electrical noise generated in sliding contacts, by Billy M. Horton. U. S. Naval Research Laboratory. Jan 1949. 33p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109862

Report of investigation of various materials and methods for transmitting electroencephalograph signals through a rotating joint. Measurements of generated electrical noise, in frequency range 0.5 to 200 cps, were made for various combinations of natural graphite, electrographite, copper, gold, silver, rhodium, mercury, and loose graphite flakes. NRL P-3408.

Microwave research. Duke University. Under Contract no. AF 19(604)-258. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Quarterly progress report, Oct 1, 1952- Jan 31, 1953, by Walter Gordy. Jan 1953. 35p graphs, tables Microfilm $2.25, Photostat $5.00. PB 109891

For earlier report see PB 108313. Contents: Bibliography of publications done under the contract. - Abstracts of current projects. - One to two millimeter wave spectroscopy, part I, by William C. King and Walter Gordy. - Molecular structure, dipole moment, and g-factor of ozone from its microwave spectrum, by R. Trambarulo, S. N. Ghosh, C. A. Burrus, Jr., and W. Gordy.

Final report. Jan 1953. 13p Microfilm $1.75, Photostat $2.50. PB 109892

1. Radio waves - Research.

Physical limitations of omnidirectional antennas, by L. J. Chu. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1948. 22p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109981

1. Antennas, Omnidirectional 2. Antennas, Omnidirectional - Theory 3. Antennas, Omnidirectional - Radiation patterns 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 64.

System for remote control of fog-alarm stations. National Research Council of Canada. Radio and Electrical Engineering Division. Feb 1953. 12p photos, map Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. Limited supply available free from Radio and Electrical Engineering Division, National Research Council of Canada, Ottawa, Canada. PB 110468

1. Fog - Warning systems - Canada 2. Radio alarms - Remote control - Canada 3. Radio, Remote control - Canada.

Electronics

Admittance of high-frequency gas discharges, by Edgar Everhart and Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1949. 9p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110572

The admittance of a high-frequency gaseous discharge between parallel plates has been measured as a function of pressure and discharge current. The susceptance is observed not to be proportional to the conductance. In fact, the discharge susceptance changes sign from negative at low pressures and low electron densities to positive at high electron densities and high pressures. The discharge admittance is expressed as a volume integral over the complex conductivity. The nonlinear relationship between discharge susceptance and conductance is shown to be a consequence of the nonuniform electron density along the direction of the field. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 108.

Axially symmetric electron beam and magnetic field systems, by L. A. Harris. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1950. 78p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.50, Photostat $10.00. PB 110527

The theory of longitudinally uniform and axially symmetric electron beams focused by a uniform axial magnetic field is presented. A general graphical method is presented for obtaining the potential distribution required for the design of hollow beams. Explicit design equations are presented for all cases. The possible effects of incidental ionization are briefly considered. Also presented as thesis. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 170.

Coding with linear systems, by John P. Costas. Massachusetts Institute of Technology. Research Laboratory of Electronics. Feb 1952. 10p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110607

Message transmission over a noisy channel is considered. Two linear networks are to be designed: one to treat the message before transmission; the second to filter the treated message plus channel noise at the receiving end. The mean-square error between the actual transmission circuit output and the desired output is minimized for a given allowable average signal power by proper network design. The results of a numerical example are given and discussed. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-O. MIT RLE TR 226.

Deionization measurements of grid-controlled thyratrons, by Frank M. Verzuh. Massachusetts Institute of Technology. Research Laboratory of Electronics. Mar 1949. 11p diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110570

This paper describes a method of evaluating the deionization time of thyratrons by means of an accurately calibrated time sweep. The apparatus permits precise control of each of the pertinent parameters, such as the amplitude and duration of the currents and voltages during the conduction and post-conduction periods. The effect of the nature of the enclosed gas upon the deionization time is presented by a study of thyratrons containing argon, hydrogen, mercury vapor and xenon gas as the active elements. The individual effects of each of the parameters in the tube and of the associated tube circuit are illustrated by suitable graphical plots. Finally, the relative merits of many commercial tubes operating under typical dynamic conditions are summarized by comparative graphs which illustrate the corresponding deionization times. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 101.

Effect of duration of light adaptation on time required for detection of a target on a simulated PPI scope, by John L. Brown, A. Leonard Diamond, Helmut E. Adler. Columbia University, New York, N. Y. Dec 1952. 27p diagr, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109898

1. Radar, PPI 2. Radar - Targets - Detection - Effect of light adaptation 3. Visual perception - Tests 4. Eyes - Light sensitivity 5. AAF WADC TR 52-259.

Effect of magnetic field on the breakdown of gases at microwave frequencies, by Benjamin Lax, W. P. Allis, Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1950. 17p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110513

The effect of magnetic field on the high-frequency breakdown of gases has been studied. The presence of energy resonance and the modification of diffusion are shown experimentally and explained theoretically. An application is made of both the average electron theory and the Boltzmann theory, and the correspondence between these two theories is discussed. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 165.

Electrical breakdown of a gas between coaxial cylinders at microwave frequencies, by Melvin A. Herlin and Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1948. 10p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110550

1. Gases - Electrical properties 2. Gases - Breakdown theory 3. SIG Contract W36-039-sc-32037 4. MIT RLE TR 72.

Electrons in perturbed periodic lattices, by J. C. Slater. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1949. 24p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110577

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Electrons - Lattic interaction 2. SIG Contract no. W36-039-sc-32037 3. MIT RLE TR 113.

Elementary theory of transmission and reflection: Fundamental relations and geometry, by R. M. Redheffer. Massachusetts Institute of Technology. Research Laboratory of Electronics. Nov 1946. 21p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109960

The concept of linearity and the relations fundamental to transmission and reflection theory are derived from the properties at the terminals of an object, without reference to its interior. The so-called vector diagram of conventional theory is interpreted as a conformal mapping, as a polar plot, and as a linear transformation. Conditions for its exact validity are obtained, as are the errors when the diagram is known to be only approximate. When no approximations are made, different interpretations of the vector diagram lead to different geometrical figures, each of which is investigated in detail. For ease of reference the results are summarized in numbered paragraphs distributed throughout the text. Contract W36-039-sc-32037. MIT RLE TR 24.

Equivalences and other relations for dielectric media, by R. M. Rehheffer. Massachusetts Institute of Technology. Research Laboratory of Electronics. Dec 1946. 20p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109962

1. Dielectric theory 2. Reciprocity - Theory 3. Equivalence point - Calculation 4. MIT RLE TR 29.

High-frequency gas breakdown in helium, by A. D. MacDonald and Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. Oct 1948. 17p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110558

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Helium - Isotopes - Breakdown theory 2. Electrons - Ionization 3. Kinetic theory 4. Boltzmann's equation 5. SIG Contract W36-039-sc-32037 6. MIT RLE TR 86.

High-frequency gas discharge breakdown, by Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. Apr 1951. 16p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110549

A phenomenological description of high-frequency gas discharge breakdown is given. The effects of superimposing on the a-c field, a small d-c field, and a magnetic field are also discussed. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 195.

Low-frequency spectrum of lock-in amplifiers, by C. A. Stutt. Massachusetts Institute of Technology. Research Laboratory of Electronics. Mar 1949. 19p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110571

The low-frequency output spectrum of the lock-in amplifier, a type of zero-frequency heterodyning device, is determined. The effect of zero-frequency heterodyning on signal-to-noise ratio is investigated. Systems which might utilize this advantage are described. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 105.

High frequency ultrasonics. II: 280 to 560 Mc/sec, by Robert A. Rapuano. Massachusetts Institute of Technology. Research Laboratory of Electronics. Apr 1950. 13p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110523

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Ultrasonics - Research 2. Ultrasonics - Testing equipment 3. Absorption, Ultrasonic - Measurement 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 151.

Magnetic filter - preliminary development, an A.E.R.E. memorandum, by D. F. Kelsall. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Jul 1950. 11p diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.50. PB 110611

A.E.R.E. CE/M 54. Revised verision of A.E.R.E. CE/M 9. HD. 850. S. O. code no. 70-674-1-40. Cover date is 1953.
1. Filters, Magnetic - Gt. Brit. 2. Atomic power - Research - Gt. Brit. 3. AERE CE/M 54 4. AERE CE/M 9, Revised.

Measurement of electron-ion recombination, by Manfred A. Biondi and Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1949. 7p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110521

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Gases, Ionized - Electron density - Measurement 2. SIG Contract W36-039-sc-32037 3. MIT RLE TR 135.

Methods of measuring the properties of ionized gases at high frequencies. Massachusetts Institute of Technology. Research Laboratory of Electronics. Signal Corps Contract DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-O. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

I: Measurements of Q, by Sanborn C. Brown and David J. Rose. Jan 1952. 18p diagrs, graphs Microfilm $1.75, Photostat $2.50. PB 110604

Experimental methods are given for determining the Q of both high- and low-Q resonant cavities at microwave frequencies. The emphasis is placed on the practical measurements necessary in determining the properties of ionized gases in the 3-cm and 10-cm wavelength range. MIT RLE TR 222.

II: Measurement of electric field, by David J. Rose and Sanborn C. Brown. Jan 1952. 9p diagrs, graphs Microfilm $1.25, Photostat $1.25. PB 110605

Experimental methods are given for determining the electric field within resonant cavities in the microwave region. Methods are discussed for calculating the electric field in both simple and complex structures used in gas-discharge studies. MIT RLE TR 223.

Microwave absorption spectrum of oxygen, by M.W.P. Strandberg, C. Y. Meng, J. G. Ingersoll. Massachusetts Institute of Technology. Research Laboratory of Electronics. Nov 1948. 10p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110559

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Oxygen - Spectrographic analysis 2. Radiation - Absorption - Measuring equipment 3. Oxygen compounds - Spectrographic analysis 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 87.

Microwave determinations of average electron energies and the first Townsend coefficient in hydrogen, by Lawrence J. Varnerin, Jr. and Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1950. 15p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110524

A microwave method of measuring the average energy of electrons in a gas in the presence of a d-c field has been developed through a measurement of the ratio between the electron diffusion and mobility. By solving for a-c and d-c distribution functions it is found possible to compare quantitatively the effective a-c ionization coefficient and the first Townsend coefficient in hydrogen. It is then possible to calculate the first Townsend coefficient from a-c breakdown data in hydrogen and these values are compared with previously determined values. Measurements of average energy have been made and values calculated from theory compared with previous measurements of average energy. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 158.

Microwave magnetic absorption spectrum of atomic cesium, by A. Roberts, Y. Beers, A. G. Hill. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1949. 31p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 110581

A new method using microwave cavity techniques has been developed for the study of the absorption of radiation in the radio frequency region by atoms and molecules. The present paper describes the application of this method to the study of the hyperfine structure of the ground states of Cs^{133}. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 120.

Microwave method of studying transient phenomena in ionized gases, by M. A. Biondi and S. C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. Feb 1947. 11p diagr, graph Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109964

1. Gases, Ionized - Electron density - Measurement 2. Gases, Ionized - Properties - Measurement 3. Helium - Energy measurements 4. Oxygen - Energy measurements 5. Electrons - Measurement 6. SIG Contract W36-039-sc-32037 7. MIT RLE TR 34.

Microwave spectra of the deutero-ammonias, by M. T. Weiss and M.W.P. Strandberg. Massachusetts Institute of Technology. Research Laboratory of Electronics. Dec 1950. 17p diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110540

Measurements of the inversion-rotation spectra of the deutero-ammonias have been made in the 7,000 Mc/sec to 80,000 Mc/sec region. Thirty-five lines of NH_2D and NHD_2 have been measured and identified by means of the Stark effect. The sign of the nuclear quadrupole coupling constant was also measured and found to be negative. The centrifugal distortion for both rotation and inversion states has been experimentally determined. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 183.

Microwave spectrum of ketene, by H. R. Johnson and M.W.P. Strandberg. Massachusetts Institute of Technology. Research Laboratory of Electronics. Mar 1951. 21p photo, diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110547

The microwave absorption spectra of the ketene molecules $H_2^1C_2^{12}O^{16}$, $HD^1C_2^2C_2^{12}O^{16}$, and $D_2^2C_2^{12}O^{16}$ have been investigated. Reciprocal moments of inertia have been determined for each from the measurements. The structure has been calculated and dipole moment measured; results check and extend the accuracy of values previously determined by other methods. Intensities of satellites of the lightest molecule corresponding to the lowest three vibrational fundamentals have also been measured, and changes in the average reciprocal moments determined. The vibrational frequencies have been calculated. References and suggestions for further work are given. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-O. MIT RLE TR 192.

Mode control and operating voltages of interdigital magnetrons, by Amarjit Singh. Harvard University. Cruft Laboratory. May 1953. 27p photos, drawings, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109792

A report is given of experiments relating to resonance frequencies and operating voltages of interdigital magnetrons. Data revealing the dependence of resonance frequencies on resonator parameters are reported. Results obtained by using this method in operating tubes are given. Contract N5 ori-76, T. O. I, NR-078-011. HU CL TR 179.

Noise theory for the magnetron. 1: The temperature limited low current density magnetron, by R. Q. Twiss. Massachusetts Institute of Technology. Research Laboratory of Electronics. Nov 1949. 41p diagrs, graph Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 110579

In Part I of this paper a noise theory is given for a temperature limited magnetron, valid for sufficiently low current densities, from which one can calculate the shot noise produced by such a tube in terms of the magnetron parameters and of the orbit of an individual electron. This theoretical noise output is compared with that actually produced by an experimental c-w magnetron type QK61 and two important differences are noted. A general discussion of the possible origins of this excess noise is given and a theory to explain it is given in Part II of this paper. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-O. MIT RLE TR 116.

Optical detection of radio-frequency resonance, by F. Bitter. Massachusetts Institute of Technology. Research Laboratory of Electronics. Mar 1949. 8p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110567

Calculations are made of the frequency, intensity, and polarization of the light emitted by an atom in a doublet P to a doublet S transition in a weak magnetic field having an oscillating component. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 98.

Propagation of an electromagnetic wave along a helix surrounded by a resistance sheath, by Andreas Tonning. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1952. 12p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110511

In this report the effect of a resistance sheath on the phase velocity of the wave and the resulting attenuation is calculated. Only the case when no electron beam is present has been treated. It is shown that the introduction of losses in this way reduces the phase velocity, and that the amount of this reduction approaches zero for very high and very low frequencies. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-O. MIT RLE TR 232.

Q measurements for high-Q cavities, by R. A. Rapuano and J. Halpern. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1946. 10p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109951

A method of determining the parameters of a high-Q cavity in bandwidth measurements at microwave frequencies is outlined. A highly stabilized oscillator is used as the reference frequency and one of the sidebands generated in a modulator is used as the variable frequency. Measurements taken with such a system show that Q's of the order of 10^5 are easily determined. Contract no. W36-039-sc-32037. MIT RLE TR 7.

Quantum theory of antiferromagnetism, by R. J. Harrison. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1950. 32p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 110529

Based on a doctoral thesis. Signal Corps project no. 102B. Dept. of the Army project no. 3-99-10-022. 1. Antiferromagnetism - Theory 2. SIG Contract W36-039-sc-32037 3. MIT RLE TR 172.

Relationship of pulsed to c-w breakdown of a gas at microwave frequencies, by Jay W. Lathrop and Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. Dec 1949. 20p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110522

Pulsed breakdown experiments have been performed in hydrogen and helium with a trace of mercury vapor. The breakdown field is theoretically calculated, assuming only free diffusion losses. One adjustable constant is introduced in the calculations. It is the ratio of the number of electrons in the cavity when ambipolar diffusion becomes appreciable to the number of electrons initially present. The theory is experimentally verified for hydrogen. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 146.

Rotational magnetic moments of $^1\Sigma$ molecules, by J. R. Eshbach and M.W.P. Strandberg. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jan 1951. 22p graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110541

The theory of the rotational magnetic moment in $^1\Sigma$ molecules is presented. This theory is applied in particular to describe experiments on the Zeeman effect for a linear rotor, OCS, and a symmetric top, NH_3. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 184.

Signal-to-noise ratios in bandpass limiters, by W.B. Davenport, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1952. 19p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110609

A general analysis is made of the relations between output signal and noise powers and input signal and noise powers for bandpass limiters having odd symmetry to their limiting characteristics. Specific results are given for the case where the limiter has an n-th root characteristic, and they include the ideal symmetrical limiter (or clipper) as a limiting case. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-O. MIT RLE TR 234.

Some applications of ultrasonics to industry, by James Kanegis. U. S. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Mimeo: $.50. PB 111190

Includes IB-288: Bibliography of reports on ultrasonics.
1. Ultrasonics - Uses 2. Ultrasonics - Bibliography 3. OTS IR 11585 4. TAS 104.

Some aspects of r-f phase control in microwave oscillators, by E. E. David, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1949. 49p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 110569

Part I of this report describes phase modulation of a synchronized oscillator caused by changes in its d-c operating conditions. The effect of varying accelerator and reflector voltages of reflex klystrons and of anode voltage of magnetrons is discussed in detail. A general approach, applicable to any oscillator, is outlined, and a brief discussion of this type of modulation as a possible carrier of information is included. Part II of this report contains the derivation and solution of a differential equation which describes the phase of such a magnetron as a function of time. The initial conditions are established in terms of the locking signal-to-preoscillation noise ratio. Pertinent reference material is included in the appendices. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 100.

Some measurements of the characteristics of a cut-off magnetron, by L. D. Smullin and J. E. Bagnall. Massachusetts Institute of Technology. Research Laboratory of Electronics. Feb 1949. 15p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110564

The electronic tuning and loading of a cutoff QK-61 magnetron are measured as functions of anode volt-

age, magnetic field, r-f signal level and heater voltage. The regions corresponding to d-c cutoff and to resonance of the space charge are identified. The results are compared with the theoretical predictions of Lamb and Phillips. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 94.

Some theoretical considerations of the proton synchroton, by R. Q. Twiss. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1947. 17p diagr Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109957

This paper is concerned with the motion of protons in a frequency-modulated synchrotron. The equations for the phase and radial oscillations are obtained and the conditions under which these oscillations are damped are discussed. The effects of changes in the r-f frequency and voltage are also analysed. It is shown that the condition for stability can be met in a practical design. Contract W36-039-sc-32037. MIT RLE TR 19.

Spectroscopic study of the electronic structure of metallic potassium and calcium, by R. H. Kingston. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1951. 31p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 110548

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102 B-O. Essentially the same as a doctoral thesis.
1. Spectroscopy, Molecular 2. Spectrograph, High vacuum - Design 3. Calcium - Spectrographic analysis 4. Potassium - Spectrographic analysis 5. SIG Contract DA36-039-sc-100. 6. MIT RLE TR 193.

Surface impedance of normal and super-conductors at 24,000 megacycles per second, by E. Maxwell, P. M. Marcus, J. C. Slater. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1949. 56p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 110573

The surface impedance of tin at 24,000 Mc/sec has been investigated in the range of temperatures from 2°K to 300°K, including both the super-conducting and normal states, by means of a resonant-cavity technique. The experimental techniques are described and the data for the normal state discussed in terms of the theory of the anomalous skin effect. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 109.

Theory of symmetrical waveguide T's, by J. C. Slater. Massachusetts Institute of Technology. Research Laboratory of Electronics. Apr 1947. 16p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109967

1. Wave guides - Theory 2. Maxwell's field equations 3. SIG Contract W36-039-sc-32037 4. MIT RLE TR 37.

Transistor, selected reference material on characteristics & applications, prepared under Contract DA36-039-sc-5589 (task 3) for Western Electric Co., Inc. Bell Telephone Laboratories, Inc., New York. Nov 1951. 800p photos, drawing, diagrs (1 fold), graphs, tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Mimeo: $20.00. PB 111054

Contents: Introduction, by J. A. Morton. - Holes and electrons, by William Shockley (From Physics today, vol. 3, p. 16-24, Oct 1950). - Physics of electronic semiconductors, by G. L. Pearson (Trans. of AIEE, vol. 66, p. 209-214, 1947). - Theory of p-n junctions in semi-conductors and p-n junction transistors, by W. Shockley (BTS J vol. 28, p. 435-489, Jul 1949). - Theory and experiment for a germanium p-n junction, by F. S. Goucher, G. L. Pearson, M. Sparks, G. K. Teal, W. Shockley (Physical review, vol. 81, no. 4, p. 637-638, 1951). - The p-n junction transistors, by W. Shockley, M. Sparks, G. K. Teal (Physical review, vol. 83, no. 1, 1. 151-162, Jul 1951. - The p-n germanium transistor, by W. G. Pfann and J. H. Scaff (Proc. IRE vol. 38, p. 1151-1154, Oct 1950). - The transistor, a new semiconductor amplifier, by J. A. Becker and J. N. Shive (Electrical engineering, vol. 68, p. 215-221, Mar 1949). - Coaxial transistor, by W. E. Kock and R. L. Wallace, Jr. (Electrical engineering, vol. 68, p. 222-223, Mar 1949). - (Phototransistor, by J. N. Shive (Bell Lab. Record, vol. 28, no. 8, p. 337-342, Aug 1950). - Aging and temperature response of point-content transistors, by R. M. Ryder. - Quality as a guide in transistor circuit design, by R. L. Wallace, Jr. and G. Raisbeck (B.S.T.J. vol. 30, p. 381-418, Apr 1951). - Some circuit aspects of the transistor, by R. M. Ryder and R. J. Kirscher (B.S.T.J. vol. 28, p. 367-401, Jul 1949). - Some circuit properties and applications of n-p-n transistors, by R. L. Wallace, Jr. and W. J. Pietenpol (B.S.T.J. vol. 30, p. 530-563, Jul 1951, and Proc. IRE vol. 39, no. 7, p. 753-767, Jul 1951). - General considerations concerning non-linear circuits and negative resistance, by B. G. Farley (Produced under Contract W36-039-sc-44497). - Idealized negative resistance characteristics of the transistor, by R. L. Trent (Produced under Contract W36-039-sc-44497). - Some switching aspects of transistors, by A. E. Anderson (Produced under Contract W36-039-sc-44497). - Some system applications of transistor amplifiers, by R. S. Caruthers. - New high-efficiency linear amplifier using a transistor and a vacuum tube, by G. Raisbeck. - High-efficiency untuned amplifier, by G. Raisbeck. - Some experimental and practical applications of transistor oscillators, by R. S. Caruthers. - Modulators in carrier telephone systems, by R. S. Caruthers. - Stabilized transistor delay and switching circuit, by A. E. Anderson (Produced under Contract W36-

039-sc-44497). - Transistor packaged circuit for multi-functional switching applications, by R. L. Trent (Produced under Contract W36-039-sc-44497). - Stabilized single transistor binary counter, by R. L. Trent (Produced under Contract W36-039-sc-44497). - Stabilized general purpose two-transistor binary counter, by R. L. Trent (Produced under Contract W36-039-sc-44497). - Transistor reversible binary counter, by R. L. Trent (Produced under Contract W36-039-sc-44497). - Four-stage binary counter, by R. L. Trent (Produced under Contract W36-039-sc-44497). - Diode gates, by L. W. Hussey (Produced under Contract W36-039-sc-44497). - Anticoincidence or "not and" gate, by W. L. Hussey (Produced under Contract W36-039-sc-44497). - Storage and addition of binary numbers, by J. R. Harris (Produced under Contract W36-039-sc-44497). - Packaged angular position encoder, by H. G. Follingstad (Produced under Contract W36-039-sc-44497). - A gray to binary translator and shift register, by R. E. Yaeger (Producted under Contract W36-039-sc-44497). - Notes on the design of high speed digital computers using transistors, by J. H. Felker (Produced under Contract Nord-10422). - Data on experimental transistor types, by J. J. Kleimack, R. J. Kircher, R. M. Ryder, John N. Shive, B. G. Farley, K. D. Smith.

Ultrasonic propagation in liquids. I: Application of pulse techniques to velocity and absorption measurements at 15 megacycles, by J. R. Pellam and John Galt. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jan 1946. 15p photo, drawing, diagr, graph, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109949

Contract OEMsr-262.
1. Sound - Absorption - Measurement 2. Sound - Speed - Measurement 3. Sound - Propagation in liquids 4. Liquids - Acoustic properties 5. NDRC Div 14 6. MIT RLE TR 4.

Zeeman-effect measurements of microwave spectra, by J. R. Eshbach and M.W.P. Strandberg. Massachusetts Institute of Technology. Research Laboratory of Electronics. Feb 1952. 13p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110606

Apparatus and experimental techniques for Zeeman-effect measurements on microwave spectra are described. A method is presented for sign determination of these gyromagnetic ratios using circularly polarized microwaves. The microwave components used in setting up the circularly polarized waves are described. Contract DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-0. MIT RLE TR 225.

Generators, Motors, Transmission

Amplitude modulation of synchronized microwave oscillators, by W. P. Schneider and E. E. David, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jul 1950. 24p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110514

It can be shown that two push-pull frequency-modulated oscillators, both synchronized by the same r-f signal, can be arranged so that their combined output contains the side bands of ordinary amplitude modulation. Linearity of the scheme is excellent even for high modulation indices. The bandwidth is somewhat less than the AM band-width of the oscillators themselves; it is about 3 Mc/sec at X-band. Experimental work with the system indicates that it has characteristics suitable for microwave relay and possibly low-power broadcast applications. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 166.

Distortion in the frequency-modulated output of a frequency-stabilized oscillator, by W. C. Galloway. Massachusetts Institute of Technology. Research Laboratory of Electronics. Feb 1948. 17p diagrs, graph, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109977

1. Oscillators - Frequency stabilization 2. Stabilizers, Microwave - Design 3. Circuits, Discriminator - Distortion 4. Vacuum tubes, Klystron - Distortion 5. SIG Contract W36-039-sc-32037 6. MIT RLE TR 57.

Frequency-stabilized oscillator unit. Notes and instructions, by R. B. Lawrance. Massachusetts Institute of Technology. Research Laboratory of Electronics. Oct 1946. 23p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109958

This instruction booklet includes (1) specific instructions for adjusting and operating these units, (2) sufficient information in the form of circuit diagrams, photographs, and reference material to aid others interested in constructing similar units, (3) sufficient technical background material so that a reasonable understanding of the equipment can be gained without extensive reference to more detailed literature. Either an oscilloscope or built-in metering circuits can be used for adjusting the equipment, and procedures for both methods are given. Contract W36-039-sc-32037. MIT RLE TR 22.

Group coincidence discrimination, by S. W. Lichtman. U. S. Naval Research Laboratory. Jun 1949. 16p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109815

Description of gated discriminator of wide flexibility, in which the selective discrimination is

achieved by grouping desired circuit functions in a mixer unit composed of diode elements. The method is suitable for sorting single and coincident events originating among a multiplicity of separate signal sources and is applied to a seven channel discriminator excited from Geiger tubes. NRL R P-3477.

Interaction of modes in magnetron oscillators, by R. R. Moats. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1951. 55p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 110528

The magnetron is described in terms of its properties as a feedback oscillator, to show that nonlinear circuit theory may be applied in discussing mode interactions. The interaction of modes is a nonlinear feedback oscillator with two resonances is considered, and it is shown that when large-amplitude oscillation associated with one mode of resonance is present, this oscillation tends to suppress oscillation associated with the other mode. Contract no. DA-36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-O. MIT RLE TR 171.

Locking phenomena in microwave oscillators, by E. E. David, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Apr 1948. 20p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109980

1. Oscillators, Microwave - Locking 2. Oscillators, Microwave - Mathematical analysis 3. Rieke diagrams 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 63.

Locking phenomena in microwave oscillators with mismatched loads, by Joseph C. Pitts, William F. Wicks, Edward E. David, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Sep 1950. 14p diagrs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110532

This report presents an exact graphical method for predicting the behavior of an oscillator, perturbed by an external signal and operating into an arbitrary but passive load impedance. The method is applicable to any oscillator, but is applied here to a reflex klystron. Both theoretical and experimental results are included. Supplement to Technical report no. 63 (PB 109980). Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 175.

New method of estimating preoscillation noise in a pulsed oscillator (magnetron), by E. E. David, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1950. 4p graph Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110530

Starting-time jitter in pulsed magnetrons is an effect often observed. It is thought to be caused principally by a corresponding initial r-f amplitude jitter resulting from preoscillation noise. Measurements of the time jitter have been extrapolated to compute the amplitude variations and subsequently the rms preoscillation noise. Values 100 decibels above that expected from a temperature-limited diode carrying the same current have been found for the QK-61 magnetron. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 173.

Note on the behavior of mutually coupled oscillators, by E. E. David, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1950. 16p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110517

The operation of an arbitrary number of oscillators mutually coupled into an arbitrary number of loads is discussed. Two simple, but practically important cases are discussed: (1) two oscillators operating into a matched parallel junction, and (2) the dual of this arrangement. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 169.

Piezoelectric transducers. Part I. Electromechanical impedance matrix. Part II. Electrical driving point impedance and admittance, by W. Roth. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jul 1947. 38p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109970

Part I: A piezoelectric transducer operating in the thickness vibration mode is represented as a six terminal network. The mesh equations, electromechanical impedance matrix and equivalent circuit valid for any general conditions of loading and frequency are obtained. All properties of the transducer can thus be determined once the impedance of the loads and the energy sources are specified. Part II: The electrical driving point impedance and admittance of a piezoelectric transducer operating in the thickness vibration mode are derived for all conditions of loading and frequency. Universal curves of these quantities are included for particular cases of importance. Contract W36-039-sc-32037. MIT RLE TR 43.

Recent developments in frequency stabilization of microwave oscillators, by W. G. Tuller, W. C. Galloway and F. P. Zaffarano. Massachusetts Institute of Technology. Research Laboratory of Electronics. Nov 1947. 14p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109976

The frequency range of the Pound stabilizer is considered and a change in the microwave circuit is described which increases the usable frequency range of the stabilizing circuit. This new circuit is discussed in detail, and a graphical method of obtaining the frequency versus voltage characteristic is presented. The effect of harmonic distortion in the output of the stabilizing circuit when the microwave oscillator is frequency modulated is discussed and the amount of the distortion is evaluated. Contract W-36-039-sc-32037. MIT RLE TR 53.

Resume of cyclotron project, by T. Moreno. Massachusetts Institute of Technology. Research Laboratory of Electronics. Oct 1947. 21p drawings, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109974

Contract W36-039-sc-32037.
1. Synchrocyclotrons - Design 2. Resonant cavities - Design 3. Oscillators - Frequency - Design 4. Condensers - Design 5. SIG Contract W36-039-sc-32037 6. MIT RLE TR 50.

Square-wave modulation of the Pound frequency stabilizer, by C. G. Aurell. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1947. 21p photos, diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109963

The problem of using the Pound circuit for obtaining a voltage with a frequency which is stabilized but has a certain type of predetermined time variation is considered. It is desired to shift the frequency periodically between two fixed values, or to have the generated voltage shifted between on and off, and frequency stabilized when on. A square-wave voltage is introduced in series between the output of the stabilizer and the repeller of the klystron oscillator. The RC-circuit at the putout of the stabilizer is the principal factor governing the transient behavior. Experimental results are shown that verify the theory, but also show its limitations. Contract W36-039-sc-32037. MIT RLE TR 30.

Theory of nonlinear transducers, by H. E. Singleton. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1950. 48p diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 110526

Transducers are classified according to the manner in which they make use of storage to control their output. The state of a transducer is specified by the position of a point in multi-dimensional space. The technique of synthesizing nonlinear transducers is considered, and standard forms for synthesizing the various kinds of transducers are obtained. The problem of optimum design of nonlinear filters is discussed. Several examples of filter design are given, including an application to the radar search problem. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 160.

Time delay relays for aircraft applications, by W. M. Tucker. U. S. Naval Research Laboratory. Jun 1948. 16p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109751

A thermal type and an electromechanical type of relay were found to have good possibilities. The thermal type containing two electrically heated bimetal strips gives a fair degree of accuracy but requires at least 45 sec. recycling time. The electromechanical type contains a timing motor whose speed is controlled by a vibrating reed. It has good accuracy and can be recycled almost instantly. NRL E-3292.

Transient starting of a magnetron as described by the inhomogeneous Van der Pol equation, by E. E. David, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1950. 15p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110516

In this study, approximate and differential analyzer solutions are used to investigate the frequency and phase transients during starting, and distortion of the build-up envelope by the exciting signal. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 168.

Miscellaneous

Case study data on productivity and factory performance: Dome reflectors, a product of the lighting fixture industry. (Based on reports submitted by five selected plants). U. S. Bureau of Labor Statistics. Feb 1952. 40p photos, diagr, graph, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109995

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.
1. Lighting fixtures - Production 2. Reflectors.

Case study data on productivity and factory performance: Fluorescent lighting fixtures. (Based on reports submitted by seven selected industrial fluorescent lighting fixture plants). U. S. Bureau of Labor Statistics. Jan 1952. 49p diagrs, tables, photos Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109993

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.

1. Lighting fixtures, Fluorescent - Production.

Case study data on productivity and factory performance: Street lighting luminaires. (Based on reports submitted by three selected plants). U. S. Bureau of Labor Statistics. Nov 1952. 60p photos, drawings, graph, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109998

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.
1. Lighting fixtures - Production 2. Street lighting 3. Lighting, Outdoors 4. Reflectors.

Design of a doubly-shaped beam antenna reflector, by J. Y. Wong and F. V. Cairns. National Research Council of Canada. Radio and Electrical Engineering Division. Mar 1953. 12p photo, diagr, graphs Available from National Research Council of Canada, Ottawa, Canada $.25. PB 110469

A doubly-curved reflector has been designed which will produce, from a point source, a shaped beam having a cosecant distribution of energy in both the vertical and horizontal planes. The technique used is an extension and modification of the method originally formulated by Chu. This method is based on the principles of conservation of energy and the laws of geometrical optics. Patterns are given for an experimental antenna using this modified method. NRCC ERA-250. NRCC 3008.

Deterioration of oxide-coated cathodes under low duty-factor operation, by J. F. Waymouth, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jul 1950. 16p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110525

Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Cathodes, Oxide - Emission 2. Cathodes, Oxide - Interface layer 3. Barium silicate 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 159.

Determination of width and luminance of a cathode-ray-tube trace, by Howard B. Ranken. Columbia University, New York, N. Y. Sep 1952. 13p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109776

Trace width is measured with an image doubler which produces two parallel images of the CRT trace; width is defined in terms of the distance between the centers of the two images when they just appear to merge. Central luminance of the trace is measured with a magnifying system in conjunction with the Macbeth illuminometer. Estimates of intra-observer and inter-observer variability are given for width and luminance measures. The method of measuring central luminance is compared experimentally with an alternative method involving a direct monocular match. Contract no. AF 33(038)-22616. AAF WADC TR 52-258.

Electric fencing. Gt. Brit. Ministry of Agriculture and Fisheries. 1953. 46p photos, diagrs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 110673

S. O. code no. 24-204-47-53.
1. Fences, Electrified - Gt. Brit. 2. MAF B 147.

Electron-beam tube for analog multiplication, by E. J. Angelo, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Oct 1952. 41p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109774

An experimental tube was built and subjected to static and dynamic tests. The tube multiplies in the following manner. A circular electron beam of relatively large diameter and with uniform current density is projected through a conventional beam-deflecting system upon a metallic target consisting of four quadrants that are insulated from one another. From the four currents collected by the target an output current is obtained that is proportional to the product of the two deflecting voltages. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102 B-O. MIT RLE TR 249.

Experimental study of optimum filters, by Charles A. Stutt. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1951. 130p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $5.00, Photostat $16.25. PB 110539

The main purpose of this study is to gain a better feeling for the use of the mean-square-error criterion in network-theory and communication-theory problems. It is concerned with the development of a time-domain technique for use in Wiener's theory for the linear system, and the compilation of experimental data on the performance of optimum-mean-square filters on certain idealized problems. One part of the design technique is a specification of the impulse response of o-m-s filters, and is pointed towards interpreting this response directly in terms of experimental correlation data. A second part is devoted to the implementation of a laboratory scheme of synthesis for this response. A flexible network, based on the convolution integral, is described. Problems, especially adapted to the m-s-e theory, are posed for the filter tests. Equipment for implementing these problems in the laboratory is described, and experimental results on the performance of o-m-s filters and, for purposes of comparison, a Butterworth-type filter, are presented. Also submitted as a thesis. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 182.

Field theory of traveling-wave tubes, by L. J. Chu and D. Jackson. Massachusetts Institute of

Technology. Research Laboratory of Electronics. Apr 1947. 26p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109968

Contract W36-039-sc-32037.
1. Tubes, Traveling wave - Theory 2. Electron beams - Electromagnetic effects 3. SIG Contract W36-039-sc-32037 4. MIT RLE TR 38.

Interference filtering, by John P. Costas. Massachusetts Institute of Technology. Research Laboratory of Electronics. Mar 1951. 46p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 110542

The problem of filtering a number of channels of information for the best recovery of one particular channel message is considered in detail. Exact solutions are obtained for filtering with long delay, and expressions for the irremovable filtering error are derived and discussed. The synthesis of optimum linear filters by approximation methods is considered. A method of approximation which tends to minimize the filtering error for a given allowable network complexity is given and detailed examples in the use of the method for the general solution of the multiple time series problem are presented. Adjacent channel interference situations are examined in detail for both double-sideband and single-sideband signals. Experimental results are presented which verify the theoretical conclusions. Contract no. DA-36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-O. Essentially the same as doctoral thesis. MIT RLE TR 185.

Investigation of anode structure in a rising-sun magnetron, by R. R. Moats. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1949. 24p photos, drawing, diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110568

To study this problem theoretically, the AX9 18-cavity rising-sun magnetron was chosen as a prototype. A set of computations of resonant frequencies for n = 9 (π-mode) and n = 8 was carried out, with the dimensions of the deeper cavities held constant, and with the shallower set taken as rectangular slots of various widths. The computed results showed less mode separation for greater width of the deeper cavities, and greater mode separation for greater width of the rectangular slots. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 99.

Microwave filters using quarter wave couplings, by R. M. Fano and A. W. Lawson. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1946. 21p photo, drawings, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109952

This paper presents a method of designing band-pass and band rejection microwave filters by appropriately transforming lumped-element filters. Such microwave filters are realized physically as chains of resonant elements coupled by quarter-wave sections of line. A structure of this type has a number of practical advantages over other types of filter structures, because it permits the construction of the resonant elements as separate units, and yields more liberal tolerances on the dimensions of the coupling irises. Contract OEMsr-262. MIT RLE TR 8.

Offset waveguide junction as a reactive element, by L. D. Smullen and W. G. Glass. Massachusetts Institute of Technology. Research Laboratory of Electronics. Sep 1950. 7p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110512

A new type of waveguide circuit element has been described that has a number of desirable electrical and mechanical properties. These include ease and accuracy of adjustment, and simple analytical expressions for some of the more important properties. The capacitive junction allows the practical construction of capacitively coupled resonant cavities. Such cavities have a relatively constant bandwidth over their tuning range, as compared with the more commonly used inductively coupled cavities. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 164.

Phasing of magnetrons, by J. C. Slater. Massachusetts Institute of Technology. Research Laboratory of Electronics. Apr 1947. 20p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109965

1. Vacuum tubes, Magnetron - Locking - Theory 2. Resonant cavities - Impedance - Theory 3. SIG Contract W36-039-sc-32037 4. MIT RLE TR 35.

Progress report for January to March 1953. National Research Council of Canada. Radio and Electrical Engineering Division. Apr 1953. 51p photos, graph Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. Limited supply available from National Research Council of Canada, Ottawa, Canada. PB 109793

1. Dielectric research - Canada 2. Navigational aids - Canada 3. Tubes, Electron - Research - Canada 4. Noise, Solar - Measurement - Canada 5. Electromedical research - Canada 6. NRCC ERA-247.

Silver oxide-zinc alkaline primary cell. Part I: Effect of temperature and of volume and concentration of electrolyte on the relationship between capacity and current density for a cell using sheet-zinc negative plates, by C. M. Shepherd. U. S. Naval Research Laboratory. Jul 1949. 29p graphs (1 fold), tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109794

The outstanding properties of the silver oxide-zinc alkaline cell are its low weight, high current density, constant voltage, and high capacity at low temperatures. Experimental work, subjected to statistical control, showed that cell failure always occurs at the negative electrode if sufficient silver oxide is present at the positive plate. The physical structure of the silver electrode, and the method of preparation and of anodizing, can all be varied over wide limits without affecting cell capacity. Equations are developed for expressing the effect of current density and temperature on cell capacity. NRL C-3478.

Some properties of the Ba_2SiO_4 oxide cathode interface, by A. Eisenstein. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1948. 31p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 110556

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Cathodes, Oxide - Emission 2. Cathodes, Oxide - Interface layer 3. Barium silicate - Electric conductivity 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 80.

Subcarrier modulation of a reflex klystron, by J. Jensen. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jan 1951. 14p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110544

This report deals with a method of modulating a reflex klystron whereby the message to be transmitted is modulated on a subcarrier, which in turn modulates the klystron through its repeller. The power output obtainable by this method is considered. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 187.

Thermionic emission from sintered cathodes of thoria and tungsten mixture, by H. Y. Fan. Massachusetts Institute of Technology. Research Laboratory of Electronics. Sep 1948. 24p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110557

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Thorium - Emissions 2. Cathodes, Tungsten-thorium - Emissions 3. Cathodes, Tungsten-thorium - Thermal properties 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 81.

Vergleichende untersuchungen über die polierwirkung eines phosphorsäure-schwefelsäure- und eines essigsäure-überchlorsaureelektrolyten (Comparative investigations of the polishing effect of a phosphoric acid-sulphuric acid electrolyte and an acetic acid-perchloric acid electrolyte), by J. Heyes. Translated and edited by F. A. Raven. May 1953. 9p graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109901

Reports from the laboratory of the firm: Dr. W. Kampschütte and Co., Solingen. Translated from Metalloberfläche, ausgabe B, vol. 3, no. 12, p. B179-B181, 1951.
1. Electrolytes - Tests - Germany 2. Polishing, Electrolytic - Germany 3. Steel - Polishing - Germany 4. Kampschütte, Dr. W., and Co., Solingen, Ger. 5. NAVSHIPS T 526 6. STS 169.

Work functions and conductivity of oxide-coated cathodes, by G. W. Mahlman. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1948. 26p diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109982

Condensed version of thesis submitted to Massachusetts Institute of Technology, 1948.
1. Cathodes, Oxide - Emission 2. Cathodes, Oxide - Temperature - Measurement 3. Coatings, Cathodic - Conductivity 4. SIG Contract W36-039-sc-32037 5. MIT RLE TR 67.

FOOD AND KINDRED PRODUCTS

Case study data on productivity and factory performance: Beet sugar refining. (Based on reports submitted by six selected plants). U. S. Bureau of Labor Statistics. Feb 1953. 90p photos, maps, graphs, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 110451

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.
1. Beets and beet sugar - Refining 2. BLS R 6.

Case study data on productivity and factory performance: Processed foods: Canned vegetables (Based on reports submitted by 12 vegetable and processing plants). U. S. Bureau of Labor Statistics. Feb 1953. 78p photos, diagr, graph, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109986

Prepared for Mutual Security Agency, Productivity and Technical Assistance Division.

1. Food, Canned 2. Vegetables, Canned - Processing 3. BLS R 8.

Fish marketing in OEEC countries, by Jean LeGarrec, Erik Heen, Fritz Hoffmann, Richard J. Sheppard, Helgi Thorarinsson, Gerhard M. Gerhardsen and Michel Girard. Organisation for European Economic Co-operation, Paris. Nov 1951. 244p tables Available from Columbia University Press, 2960 Boardway, New York 27, N. Y. $2.50.
PB 110638

1. Fishing industry - Europe 2. Fish - Marketing - Europe 3. Fish - Prices - Europe.

Hybrid maize (corn) in European countries. Report by United States specialists, Merle T. Jenkins, William P. Watkins, Carl E. Ferguson and Robert C. Eckhardt. Organisation for European Economic Co-operation, Paris. 1950. 58p tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $.50. PB 110632

1. Corn - Cultivation - Europe 2. Corn - Production - Europe.

Hybrid maize (corn), progress in OEEC countries, by G. F. Sprague and A. L. Lang. Organisation for European Economic Co-operation, Paris. 1952. 46p tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $1.00.
PB 110631

Technical Assistance Mission no. 96.
1. Corn - Cultivation - Europe 2. Corn - Production - Europe 3. OEEC TAR 96.

Pasture and fodder development in Mediterranean countries. Organisation for European Economic Co-operation, Paris. 1951. 167p Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $3.50. PB 110634

Contents: Part I: General survey report. - Part II: Country survey report. - Part III: Summary of technical papers delivered at the Rome conference, 7th-9th June, 1951. Introductory: - Aamodt, Olaf S. What are improved pasture and fodder crops. - Prince, Ford S. Influence of soil fertility. - Donald, C. M. Integration of pastures, fodders, livestock and crops. - Rowland, J. W. Research methods in the development of rotations. - Whyte, R. O. Mountain resources. - Bandini, M. Social and economic problems connected with the increase of pasture and fodder production in southern Italy. - der Khatchadourian, (Mr) Farm advisory methods for improving fodder production. - Montanari, V. Farm advisory services in plans for increased pasture and fodder production. - Aamodt, Olaf S. Implementing a Mediterranean programme for pasture and fodder production. - Maymone, B. Some comments on the Mediterranean survey and conference. - Davies, William. Summing up of conference proceedings. Annex I: Resolutions adopted by the Conference on Grassland and Fodder Problems of the Mediterranean Area, Rome, 7th-9th June 1951. - Annex II: Attendance at the preconference, Rome, 17th-19th May 1951. - III: List of delegates to the conference, Rome, 7th-9th June 1951. Circulated under symbol AG(51)14. OEEC TAR 56.

Report of the Food Investigation Board, with the report of the Director of Food Investigation for the year 1952. Gt. Brit. Dept. of Scientific and Industrial Research. Food Investigation Board. 1953. 62p diagr Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.50. PB 110674

S. O. code no. 47-7-0-52.
1. Food - Research - Gt. Brit. 2. Food - Investigation - Gt. Brit.

FUELS AND LUBRICANTS

Development of test methods for evaluation of materials used as thread and anti-seize compounds, Quarterly report, Oct-Dec 1951, by John W. Cunningham and William A. Moore. Southwest Research Institute, San Antonio, Texas. Jan 1952. 33p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00.
PB 110476

Work during the third quarter resulted in the development of metal specimens for this test which are suitable for exposure to severe simulated use conditions such as high temperatures in the range of 1200° to 2000°F or the presence of liquid or gaseous oxygen. The results of seizure tests made with several commercial compounds after exposure to high temperature are included.

Full-scale engine performance of aviation oils, test no. 2 carried out under contract AF 33(038)-2261, report by W. E. McTurk, J. W. Hand, Jr., R. F. Overhof, E.F.H. Pennekamp. Standard Oil Development Co. Esso Laboratories. Research Division, Elizabeth, N. J. Oct 1950. 105p photos, graphs (part fold), tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $4.50, Photostat $13.75. PB 110479

Test No. 2 on full-scale engine performance of aviation oils was conducted to determine the performance of an aviation oil containing 6.0 weight % of a nonmetallic detergent-oxidation inhibitor type of additive, in comparison with the performance of an approved mineral oil in the previous reference test. Report no. RL-7M-50(68).

Oil refining and drilling in the U.S.A. Report by a group of European experts. Organisation for European Economic Co-operation, Paris. Oct 1952. 254p diagrs (4 fold), graphs, tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $5.00.
PB 110626

Technical assistance mission no. 68.
1. Oil refineries 2. Oil industries 3. Petroleum - Well drilling 4. OEEC TAR 68.

Performance studies of experimental aviation fuels employing high antiknock blend agents, by W. W. Frank and A. H. Fox. Standard Oil Co. of Indiana. Research Dept. Whiting Laboratory, Whiting, Ind. Aug 1950. 18p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50.
PB 110480

A typical 115/145 grade aviation fuel of conventional sensitivity, and an experimental super-fuel blend containing 22.6% added aromatics (toluene), were tested for comparison of their knock limited performance. The data are presented graphically in the form of knock-limited mixture response curves plotting knock-limited bmep and imep of the test and reference fuels vs F/A ratio at various rpm, inlet air temperatures, spark advance, and compression ratios. Report no. 8.

Production characteristics of a model dissolved gas drive petroleum reservoir, by Donald W. Roberts. 1949. 48p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 110488

The crux of the problem is the correlation of laboratory data to field performance, and the validity of the laboratory data itself. The primary objective has been to determine if the equipment and techniques outlined can yield reproducible results. Thesis-University of Tulsa. Some pages will not reproduce well.

Swedish shale oil, production methods in Sweden. Organisation for European Economic Co-operation, Paris. Oct 1952. 84p photos, drawings, diagrs, tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $2.00.
PB 110625

Technical assistance mission no. 93.
1. Shale oil - Production - Sweden 2. Shale oil industry - Sweden 3. OEEC TAR 93.

HIGHWAYS AND BRIDGES

Specifications for the construction of housing estate roads using soil-cement. Gt. Brit. Dept. of Scientific and Industrial Research. Road Research Laboratory, Harmondsworth, England. 1953. 18p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.25.
PB 110672

S. O. code no. 47-141-15.
1. Roads - Construction - Gt. Brit. 2. Roads - Surface treatment - Soil compaction - Gt. Brit. 3. Cement, Soil - Uses - Gt. Brit. 4. DSIR RRL RN15.

INSTRUMENTS

Adjustable band-width F. M. discriminator, by W. G. Tuller and T. P. Cheatham, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1946. 10p diagr, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25.
PB 109950

If the pentode amplifier normally used to drive a Foster-Seeley discriminator is replaced by a cathode follower, the resultant discriminator circuit takes on new characteristics. Among these are easily adjustable band-width, output-frequency characteristics complementary to the frequency-voltage characteristics of frequency modulated stabilized microwave oscillators, and freedom from critical adjustments. Curves showing harmonic distortion as a function of deviation are given. Contract OEMsr-262. MIT RLE TR 6.

Analysis of step approximation to a continuous function, by E. R. Kretzmer. Massachusetts Institute of Technology. Research Laboratory of Electronics. Aug 1946. 12p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109954

A continuous function, such as an intelligence wave, can be simulated by various types of step approximations. In this paper a simple type of such a step approximation of a sinusoidal wave is subjected to a spectrum analysis. The results show to what extent the approximated function differs from the original function, and how this difference can be reduced. Contract W36-039-sc-32037. MIT RLE TR 12.

Analog device for the solution of simultaneous 10x10 linear and secular equations, by David C. Evans. Utah. University. Dept. of Physics, Salt Lake City, Utah. Mar 1953. 42p photos, diagrs (1 fold) Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25.
PB 109617

Contract no. AF 19(122)-392. Stratospheric radiation technical report no. 8.
1. Computers, Analog - Design 2. Equations - Linear.

Application of fast sweep synchroscope to measurement of rapidly rising pulses, by D. F. Winter and O. T. Fundingsland. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jan 1947. 24p photos, drawing, diagrs (1 fold), graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75.
PB 109961

Contract W36-039-sc-32037.
1. Synchroscopes - Uses 2. Oscilloscopes - Sweep circuits 3. Generators, Pulse - Design 4. Vacuum tubes, Magnetron - Performance 5. SIG Contract W36-039-sc-32037 6. MIT RLE TR 27.

Conversion of an attenuator to phase shifter and the calibration of both, by John Reed. Massachusetts Institute of Technology. Research Laboratory of Electronics. Sep 1946. 13p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109956

X-band phase shifters and attenuators suitable for use in the guided-missiles project are obtained by modifying Attenuator TPX-27GM/25. The necessary changes are described as well as the procedure for calibrating these instruments. With the phase shifters as originally designed, extraneous resonances were introduced. These were studied and the means of eliminating them are discussed. Contract W36-039-sc-32037. MIT RLE TR 15.

Correlator errors due to finite observation intervals, by Wilbur B. Davenport, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Mar 1951. 17p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110546

A measurement signal-to-noise ratio is defined as the reciprocal of a normalized rms measurement error. This ratio is evaluated for the general continuous correlator and for the general sampling correlator. The limiting behavior of the signal-to-noise ratio is studied for several specific cases. The continuous correlator cases considered are those where the averaging filter is: (a) a perfect integrator, and (b) an RC low-pass filter. The sampling correlator special case considered is that where the sampling is done periodically. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 191.

Current status of quartz crystal units and circuitry for frequency control, by Douglas A. Venn. U. S. Naval Research Laboratory. Apr 1953. 34p photos, diagrs, graphs, table Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.00. PB 111176

Contents: Appendix A. New technique for VHF impedance measurements of piezo-electric crystals at resonance, by Douglas A. Venn. - Appendix B. Bridge-T oscillator, by Gomer L. Davies, T.C.G. Wagner, and W. Fred Kennedy. - Appendix C. The Lister circuit, by Gomer L. Davies, T.C.G. Wagner, and W. Fred Kennedy. NRL R 4140.

Design and operation of digital calculating machinery. Harvard University. Computation Laboratory. Progress report no. 21 covering period 10 Nov 1951-10 Feb 1952, by Holly Wilkins, Myron Huxtable, Lloyd Cali and Robert Burns. Feb 1952. 173f photos, diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $6.50, Enlargement Print $23.75. PB 109782

Contract no. AF33(038)-9461. For 5th-7th, 12th-14th, 16th-17th, 19th reports see PB 107827, 109946-109948, 109780, 108959-108960, 108855, 108961. Contents: I. Photographs on the progress of Mark IV and a summary on testing. - II. Tape setup and number wheels circuit, by Kenneth Perry. - III. Shift circuit. - IV. Mark IV slow storage by Gerry Blaauw. - V. Electronic switch, by Charles Coolidge. - VI. Computation services. - VII. Reports on methods and solutions of Air Force problems on Mark I calculator: Problem report no. 32. Tables of Pearson's type III function (AF problem no. 32, by Warren Semon). - Tracing of skew rays through an aerial lens design (AF problem 65) by Iran King. - Problem report no. 34. Tabulation of J_n (312.5), n-o (1)350 (AF problem 66), by Ted Singer.

Electronic method for approximating the frequency spectra of transient functions, by E. S. Hoffer. U. S. Naval Research Laboratory. Jan 1949. 14p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109890

It is shown that any method for obtaining the spectra (i.e., plots of component amplitude versus frequency) of periodic functions can be used, in a manner described, to determine approximately the spectra of a broad class of transient functions. The problem is thus simplified in that only an instrument for obtaining the spectra of periodic functions need be found. A wave analyzer is then considered as such an instrument. NRL F 3406.

Experimental study of nonlinear devices by correlation methods, by L. Weinberg and L. G. Kraft. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jan 1951. 30p photo, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110535

The correlation technique is applied experimentally to determine the power density spectra of the output of two nonlinear devices, the linear and square-law rectifiers. Curves of the autocorrelation function obtained experimentally for inputs of filtered noise with and without a sine wave are compared with the theoretically calculated curves, and thus an experimental check on some known theoretical results is obtained. Contract no. DA36-039-sc-100. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-O. MIT RLE TR 178.

Hyperfine structure of Na^{22}, by L. Davis, Jr. Massachusetts Institute of Technology. Research Laboratory of Electronics. Dec 1948. 58p drawings, diagrs, graphs, table Available from Library of Congress, Publication Board Project,

Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 110560

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. Identical with a thesis submitted in 1948.
1. Radiosodium - Spectrographic analysis 2. Detectors, Ionization - Design 3. Electron multipliers - Design 4. Nuclei - Magnetic moments 5. Beta rays - Emission 6. SIG Contract W36-039-sc-32037 7. MIT RLE TR 88.

Investigations for design of digital calculating machinery. Progress report no. 6 covering period Aug 10, 1949 to Nov 10, 1949, under Contract W19-122-ac-24, by Richard Hofheimer and Jean Crawford. Harvard University. Computation Laboratory. Nov 1949. 163p photos, diagrs, graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $6.25, Photostat $21.25. PB 109946

For 5th, 7th, 12th-14th, 16th-17th, 19th-21st reports see PB 107827, 109947-109948, 109780, 108655, 108959-108961, 109782. Contents: I. Computation service (status of problems). II. Instrument calibration (A. F. problem no. 4), by Peter Strong. Electric linear accelerator (A. F. problem no. 19), by John Harr. Guided missile trajectories (A. F. problem no. 25), by Peter Strong. Waveguide attenuation tables (A. F. problem no. 30-B) by Warren Semon. - III. Logical design of vacuum tube circuits for computing machinery: Accumulators, by Howard Aiken and Theodore Kalin. - IV. Theoretical analysis of magnetic delay lines, by An Wang. - V. New design for magnetic heads, by Robert Wilkins. VI. Selenium rectifiers as circuit elements in computers, by Guy Boucher. - VII. Construction of magnetic drum storage systems, by Elbert Little and Way Dong Woo. - VIII. Facsimile printed, by John Rothery. - IX. Circuit for the logical operation "and", by Eugene Grant.

Measurements of ambipolar diffusion in helium, by Manfred A. Biondi and Sanborn C. Brown. Massachusetts Institute of Technology. Research Laboratory of Electronics. Feb 1949. 13p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110565

Microwave techniques are applied to the study of the diffusion of electrons and positive ions in helium. For the electron and ion densities realized experimentally, the diffusion takes place ambipolarly; that is, the flow of charged particles of both signs is equalized by the space-charge field which they set up. At 1 mm Hg pressure and 0.039 ev average energy, the measured value of the ambipolar-diffusion coefficient, D_a, is 540 cm^2/sec. The measured variation of D_a with gas density, energy of the particles, and diffusion-container size and shape agrees closely with theory. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 96.

Microwave gas discharge counter for the detection of ionizing radiation, by Sanborn C. Brown and John J. McCarthy. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jul 1948. 19p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110552

Characteristics of a gamma-ray counter making use of a 3000-Mc gas discharge in a coaxial-mode cavity resonator are described. A quenching agent is present to suppress electron emission from positive-ion bombardment of the walls. Contract no. W36-039-sc-32037. MIT RLE TR 75.

Monoformer development. Termination report under Contract AF19(122)-83, by Allen C. Munster and Stanley Zebrowitz. Philco Corporation, Philadelphia, Pa. Nov 1949. 131p photos, drawings, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $5.50, Photostat $17.50. PB 109942

The monoformer, as described in this report, is a four-terminal device with arbitrary input-output characteristics. It is analyzed herein both mathematically and from a purely physical point of view. The properties of both printed and split target monoformer tubes are discussed, including detailed information as to their construction. The operating characteristics of several monoformers are treated, including logarithmic monoformers. CD-899.

Portable servo recorder for antenna patterns, by O. A. Tyson and W.J.E. Edwards. U. S. Naval Research Laboratory. Jul 1949. 13p photos, fold diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109796

Description of a portable, direct-inking, single-package, directive-antenna-pattern recorder with effective plotting size of 7 x 10 inches and with an 80-db range of input voltage plotted against angular position of the antenna in rectangular coordinates. Based upon the follow-up servo principle, the mechanism has a plotting table motion accurate to about $\pm 1/4''$ of a precision antenna mount having a normal 1-to-36 synchro angular take-off. Entire unit weighs less than 200 lbs. NRL R 3498.

Rapid-scanning auroral spectrometer, by D. M. Hunten. Saskatchewan. University, Physics Dept. n.d. 15p photos, diagrs, graphs Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Mimeo: $.50. PB 111193

A spectrometer is described which is capable of obtaining an auroral spectrum in ten seconds with

10A resolution. It uses a 4 by 4 inch, 6000 lines/cm. grating and parabolic mirrors for focusing. The detector is a 1P21 photomultiplier cooled by dry ice, and the spectrum is recorded by a high-speed magnetic oscillograph. The amplifiers are described and a few sample spectra shown. Some relevant optical equations are collected in an appendix. Scientific report no. AR-10. Contract AF19(122)-152 with Geophysics Research Division of the Air Force Cambridge Research Center.

Review papers from a symposium on molecular structure and spectroscopy, Ohio State University, Columbus, 11-15 Jun 1951, under the joint sponsorship of the University and the American Physical Society. Ohio State University, Columbus, O. 1951. 51p photo, drawing, graphs, tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.50. PB 111166

Contents: Review of recent near-infrared grating spectroscopy, by Alvin H. Nielsen. - Introductory paper on Raman spectroscopy, by Forrest F. Cleveland. - Intensities of infrared bands, by David Z. Robinson.

Short-time correlator for speech waves, by P. E. A. Cowley, R. M. Fano, B. L. Basore. Massachusetts Institute of Technology. Research Laboratory of Electronics. Feb 1951. 23p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110531

The equipment described is designed to analyze speech of a quality suitable for toll-telephone circuits. The design is discussed in some detail and circuit diagrams of the equipment are presented. Some experimental results are included of short-time correlation patterns of speech sounds, sinusoids, noise, and combinations of these waveforms. Contract no. DA-36-039-sc-100. Dept. of the Army Project no. 3-99-10-022. Signal Corps project no. 8-102 B-O. MIT RLE TR 174.

Signal-to-noise ratio in correlation detectors, by R. M. Fano. Massachusetts Institute of Technology. Research Laboratory of Electronics. Feb 1951. 14p diagr Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110543

This paper discusses the operation in the presence of noise of a correlation detector consisting of a multiplier followed by a low-pass filter. It is shown that in the most favorable cases the output signal-to-noise power ratio is proportional to the corresponding input radio and to the ratio of the signal bandwidth to the bandwidth of the low-pass filter. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 186.

Simplified procedure for refilling Geiger-Mueller tubes, by Henry A. Garon. U. S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Jun 1953. 13p drawings, graph, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110464

Project 4-12-01-006.
1. Geiger-Mueller counters - Maintenance and repair 2. Geiger-Mueller counters - Altitude adaptation 3. CC CRL R218.

Small ion balance over the ocean, by V. F. Hess and W. D. Parkinson. Fordham University. Dept. of Physics, New York, N. Y. Dec 1952. 33p drawing, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109624

Contract AF19(122)-409. Scientific report no. 2.
1. Atmosphere - Ionization - Measurement
2. Meters, Conductivity - Design 3. Ionization chambers - Design 4. Aitken kern counter (Trade name).

Some measurements of phase velocity along a helix with dielectric supports, by L. A. Harris, H. R. Johnson, A. Karp, L. D. Smullin. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jan 1949. 10p photo, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 110563

Measurements of the propagation characteristics of several helixes are described. The tendency of some traveling-wave tubes to oscillate at about half their nominal operating frequencies is explained in terms of the gain and phase-velocity characteristics as functions of frequency. Tubular helix supports and dielectric-rod supports are examined, and a new type of low-dielectric-constant support is suggested. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 93.

Survey of methods used to determine the optical properties of phosphors, by Wayne B. Nottingham. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1949. 14p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110574

A brief review of the theory of phosphors is given in terms of the electron-band picture of impurity semiconductors in order to show the reasons for researches designed to obtain the optical properties of phosphors. The automatic spectroradiometer is described. A brief discussion is given of the application of the LC.I. system to aid in the choice of phosphors required to produce a suitable "white" for television cathode-ray tubes. Other researches discussed include the determination of phosphor excitation curves, the emission of light as a function of temperature and of time, and the correlation of spectral excitation and absorption

data. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. Abridgement of paper given at meeting of the Optical Society of America, New York, Mar 10, 1949. MIT RLE TR 110.

Theory of critical fluctuations, by M. J. Klein and L. Tisza. Massachusetts Institute of Technology. Research Laboratory of Electronics. Apr 1949. 21p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110575

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Thermodynamics - Fluctuations 2. Fluctuations, Thermal 3. Parameters, Thermodynamic 4. SIG Contract no. W36-039-sc-32037 5. MIT RLE TR 111.

Visibility of submerged objects. Final report under Contracts N5ori-07831, N5ori-07864, and Nobs-50378, by Seibert Q. Duntley. Massachusetts Institute of Technology. Visibility Laboratory. Aug 1952. 86p photos, diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 110610

Includes Errata, Jun 16, 1953. Chapter VI is Visibility from aircraft by Frances R. Culver. Chapter VII is Contrast reduction by the atmosphere, by Rudolph W. Preisendorfer.
1. Visibility, Underwater 2. Visibility - Measurements 3. Photometers, Underwater - Design 4. Water meters - Design.

LUMBER AND WOOD PRODUCTS

American forest operations and tropical timber production. Organisation for European Economic Co-operation, Paris. 1951. 115p photos, maps Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $2.50. PB 110619

Technical assistance mission no. 18A, Pt. I. For Technical assistance mission, no. 18A, Pt. II, see PB 110620. For technical assistance mission, no. 18, Pts I-II see PB 110621 and PB 110636. Circulated under symbol BO951)2/OT(51)4.
1. Forests and forestry 2. Forest products 3. Timber, Tropical - Production 4. Lumbering 5. Sawmills 6. OEEC TAR 18A, Vol. I.

American poplar, its importance for Europe. Organisation for European Economic Co-operation, Paris. 1951. 63p photos, maps, diagrs, tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $1.00. PB 110637

1. Poplar - Cultivation 2. Poplar - Uses 3. OEEC TAR 13.

American sylviculture and tropical forest problems. Report by a mission on the overseas territories. Organisation for European Economic Co-operation, Paris. 1952. 95p map Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $1.25. PB 110620

Technical assistance mission no. 18A, Pt. II. For Technical assistance mission, no. 18A, Pt. I, see PB 110619. For technical assistance mission no. 18, Pts I-II see PB 110621 and PB 110636.
1. Forests and forestry 2. Forest products 3. Timber, Tropical - Production 4. Lumbering 5. Sawmills 6. OEEC TAR 18A, vol. II.

Diseases of the chestnut and poplar in Europe, report by G. F. Gravatt. Organisation for European Economic Co-operation, Paris. Feb 1952. 24p Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $.50. PB 110630

1. Poplar - Diseases - Europe 2. Chestnut (Tree) - Diseases - Europe 3. Trees - Diseases - Europe

Plywood som konstruktionsmaterial (Plywood as a material in constructional design) av Göran Larsson och Georg Wästlund. Sweden. Statens Kommitte för Byggnadsforskning. Feb 1953. 127p photos, graphs, tables (Text in Swedish) Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $5.00, Photostat $16.25. PB 109926

Summary in English.
1. Plywood - Strength - Sweden 2. Building materials - Tests - Sweden 3. Sweden. Statens Kommitte för Byggnadsforskning. Meddelanden nr. 21.

Timber: American forest operations and increase of European productivity, report by a mission of European experts. Organisation for European Economic Co-operation, Paris. 1952. 256p photos, tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $6.00. PB 110621

Technical assistance mission no. 18, Pt. I. For Technical assistance mission no. 18, Pt. II, see PB 110636. For Technical assistance mission no. 18A, Vol. I and no. 18A, Vol. II see PB 110619 and PB 110620.
1. Forests and forestry 2. Forest products 3. Timber, Tropical - Production 4. Lumbering 5. Sawmills 6. Veneers - Manufacture 7. Plywood - Manufacture 8. Woodwaste - Utilization 9. OEEC TAR 18, Pt. I.

MACHINERY

Case study data on productivity and factory performance: Fractional horsepower motors. (Based on reports submitted by six selected plants), 1951. U.S. Bureau of Labor Statistics. May 1953. 175p photos, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109984

Prepared for Mutual Security Agency, Productivity and Technical Assistance Division.
1. Motors, Electric - Manufacture 2. BLS R 23.

METALS AND METAL PRODUCTS

Design factors in knobs and levers for making settings on scales and scopes, a summary report, by William L. Jenkins. Lehigh University, Bethlehem, Pa. Feb 1953. 8p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109616

This is a brief summary of five detailed research reports prepared by Lehigh University on the design of knobs and levers. It is intended to provide the design engineer with a convenient integration of the major findings of the research. This research indicates that the time required to make a setting is affected more by the ratio of control movement to indicator movement than by inertia, friction, backlash, setting tolerance, or control size. Contract no. AF 18(600)-24. AAF WADC TR 53-2.

Economic investigation of solid journal bearing operation in freight service on two large class I railways, by Roy M. Wright, Donald E. Taylor, Robert Ferber and Frances S. Dotson. Illinois. Engineering Experiment Station, Urbana, Illinois. Feb 1953. 110p drawings, diagrs, graphs, tables Available from University of Illinois, Engineering Experiment Station, Urbana, Ill. $1.00. PB 109646

University of Illinois Bulletin, vol. 50, no. 46, Feb 1953.
1. Railroads - Rolling stock - Maintenance and repair 2. Bearings, Journal - Operation costs 3. ILU EES B 406.

Mechanical tests: Development of a standard bend test for cemented carbides, by Alden M. Burghardt and Alexander S. Elder. U. S. Arsenal, Watertown, Mass. Feb 1950. 29p photos, drawing, diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110493

O. O. project number: TB4-70F.
1. Bend testing machines 2. Carbides, Cemented - Bend tests 3. WAL R110/16.

Stress distribution and strength condition of two rolling cylinders pressed together, by Eugene I. Radzimovsky. Illinois. Engineering Experiment Station, Urbana, Illinois. Feb 1953. 40p diagrs, graphs, tables Available from University of Illinois, Engineering Experiment Station, Urbana, Illinois. $.50. PB 109648

University of Illinois Bulletin, vol. 50, no. 44 , Feb 1953.
1. Metals - Fatigue 2. Gears - Friction 3. Roller bearings - Friction 4. Ball bearings - Friction 5. Cylinders, Rolling - Stress distribution 6. ILU EES B 408.

Analysis of the theory, history, and development of methods of continuous casting of metals, by Robert L. Seaman. Jan 1950. 93p drawings, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $4.25, Photostat $12.50. PB 110470

Thesis-Rensselaer Polytechnic Institute. Some pages may not reproduce well. The underlying theories pertinent to direct rolling and continuous casting methods are discussed. A brief history of the methods is given to form a basis for the examination of these methods from the viewpoints of experimental and pilot plant operations. Comparative analyses are made using flow process charts to illustrate the savings in time and money through the application of these processes.

Appraisal of research and development of permanent magnet materials, by the Panel on Permanent Magnet Materials of the Minerals and Metals Advisory Board. National Research Council. Division of Engineering and Industrial Research. Minerals and Metals Advisory Board. Jun 1953. 211p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $7.75, Photostat $27.50. Limited supply available free from Minerals and Metals Advisory Board, National Research Council, Washington 25, D. C. PB 109913

Contents: - Appendix I: Supply and demand for cobalt and nickel. - Appendix II: Engineering aspects of cobalt-nickel permanent magnet alloy substitution. - Appraisal of the present research effort. - Appendix IV: Resume of the status of permanent magnet theory. - Appendix V: Methods for making ultra-fine, shaped metal powders. - Appendix VI: Board comments. MMAB-34-M.

Behavior of materials under conditions of thermal stress, by S. S. Manson. U. S. National Advisory Committee for Aeronautics. Jul 1953. 105p photos, drawings, diagrs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109835

1. Airplanes - Materials - Aluminum alloys 2. Airplanes - Materials - Ceramics 3. Airplanes - Materials - Thermal properties 4. Aluminum oxide - Thermal properties 5. Boron oxides - Thermal properties 6. Ceramics - Thermal conductivity 7. Ceramics, Aluminum oxide 9. Ceramals - Thermal properties 10. NACA TN 2933.

Bonding materials, metallic mating surfaces: Low RF impedance. Report no. 1 under Contract no. AF33(038) 23583, by Gary Steven. Armour Research Foundation, Chicago, Illinois. Jun 1951.

6p photo Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109855

1. Bonding, Metallic 2. Bonding - Materials 3. Gaskets - Materials - Electrical properties 4. ARF Proj 90-1006B Report no. 1.

Case study data on productivity and factory performance: Gray iron foundries. U. S. Bureau of Labor Statistics. Aug 1951. 112p photos, drawings, diagrs, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109991

A preliminary edition of this report, for technical criticism, was dated March 1951. Prepared for the Economic Cooperation Administration, Technical Assistance Division.
1. Cast iron - Production statistics 2. Iron industry 3. Iron foundries 4. Foundry practice.

Comparison of framing in welded steel and aluminum, including the design of welded steel and aluminum plate girders and trusses, by Gordon Dickson Orr, Jr. May 1950. 87p fold drawings, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 110502

Contains the results of an investigation undertaken to determine economics that might be obtained by using aluminum in fabricated structural units. This was accomplished by designing welded plate girders and trusses in both steel and aluminum, for the same conditions of load, span and section depths within limits stipulated. Thesis-Rensselaer Polytechnic Institute.

Effect of stresses and thermal cycles present in arc-welded plate on the impact properties of a low-carbon, aluminum-killed steel, by Thomas L. Robertshaw. Jun 1950. 39p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 110477

Contains the results of an investigation to find the reasons for poor impact properties found in a low-carbon, aluminum-killed steel when that steel was introduced to conditions normally met in 1/2 in. plate during arc-welding. The conditions of stress and of thermal cycle were closely reproduced by separate means. The effects of strain-aging, solution heat treatment, and strain hardening on this steel were studied separately. Thesis-Rensselaer Polytechnic Institute.

Effect of the catalytic ion on obtaining crack free structures in chromium plating, by Herbert L. Kee. Jan 1950. 37p photos, diagrs, graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 110499

An investigation was made to determine if a hard crack-free structure or a higher current efficiency might be obtained by electroplating chromium in a chromic acid bath with an ion other than the sulfate ion. Current efficiency tests were made with special solutions containing fluoride ions from NH_4FHF, Na_2SiF_6, and HF in the stock solution of 2.5 M chromic acid. Thesis-Rensselaer Polytechnic Institute.

Effect of welding variables on the depth, width and area of fusion in an aluminum alloy, using the alternating current, argon-shielded tungsten arc welding process, by Jack W. Cuthbert. Jun 1949. 73p graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.50, Photostat $10.00. PB 110482

An investigation was made of the effects of arc current speed of travel, arc length and argon flow on the width, depth, and areas of the zone of fusion in aluminum alloy welded by the alternating current, argon-shielded, tungsten arc process. The main purpose was to determine the energy input vs. penetration relationship, which must be known to predict current and speed-of-travel conditions for satisfactory welding. Tests were made on 52S-O aluminum. Thesis-Rensselaer Polytechnic Institute. Some pages may not reproduce well.

Evaluation of the methods for measuring residual stress at the surface of quenched steels, by James W. O'Brien. Jun 1949. 43p photos, diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 110481

Since it is difficult to measure residual stress in martensite, this stress was measured in as-quenched steel. In the production of tempered steel parts, tempering temperature and time may bring the steel into the temper-brittle range. Methods involving the use of brittle lacquer, and of sectioning a specimen with resistance strain gages attached to the surface, were unsuccessful. The use of X-ray diffraction to measure the residual stresses has been found to be practical when chromium radiation in the back reflection field is employed. Thesis-Rensselaer Polytechnic Institute.

Experimental investigation and limit analysis of net area in tension, by W. G. Brady and D. C. Drucker. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. May 1953. 52p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 110509

The old question of the weakening effect of holes in tension members is re-examined from the viewpoint of plastic action. Using the maximum shearing stress yield criterion and the Mises criterion, upper and lower bounds for the limit load are computed for thin sheets with six configurations of staggered rows of holes. Comparison is made with current design specifications, and with the results

of a large number of tests performed on hot-rolled steel and on 61S-T6 aluminum alloy sheet. Contract N7onr-35801, T. O. I, NR-041-032. GDAM A11-89/36. GDAM TR 89.

Fatigue life of decarburized and carbon restored investment cast SAE 1040 steel, by Wade H. Shafer. U. S. Arsenal, Watervliet, N. Y. Jun 1953. 161p photos, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $6.25, Photostat $21.25. PB 110463

The five conditions of test were as follows: 1. Decarburized and no carbon restoration. 2. 5 hours carbon restoration. 3. 12 hours carbon restoration 4. Decarburized surfaces machined from oversize specimens, copper plated, and heat treated with specimens that were carbon restored for 12 hours. 5. Decarburized specimens copper plated and heat treated with specimens that were carbon restored for 12 hours. Microstructure studies, carbon diffusion curves, and related information are presented for each different condition of test. Also submitted as Thesis-Rensselaer Polytechnic Institute.

Ferromagnetic resonance at microwave frequencies in an iron single crystal, by Arthur F. Kip and Robert D. Arnold. Massachusetts Institute of Technology. Research Laboratory of Electronics. Dec 1948. 11p diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110562

Ferromagnetic resonance absorption in a single iron crystal has been observed at 23,675 and 9260 Mc/sec, using an external magnetic field applied perpendicular to the r-f magnetic field in the plane of the crystal surface. A variation in the resonance field is found which depends on the angle the magnetic field makes with the crystal axes. In the case of the lower frequency, deviations from the expected angular variation and a second resonance peak are shown to be the result of incomplete alignment of the magnetization with the direction of applied field. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 91.

Internal friction in metal single crystals, by Donald Kent McGraw. Jun 1950. 43p photos, diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 110506

The internal friction of single crystals of copper, lead and zinc was investigated by means of pulsed ultrasonic techniques. Equipment and procedures used for the measurement of ultrasonic velocities and attenuation in the megacycle range are described, and theories interpreting the observed behavior are presented. Thesis-Rensselaer Polytechnic Institute.

Investigation of infiltrated and sintered titanium carbide. Sintercast Corporation of America, Yonkers, N. Y. On Contract no. AF33(038)-16103. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Progress report no. 5, July and Aug 1951. Production of titanium carbide, by John B. Adamec. Sep 1951. 26p photos, graphs Microfilm $2.00, Photostat $3.75. PB 109767

The materials are to be composite structures of a suitable refractory metal compound, viz. titanium carbide, and a heat-resistant and corrosion-resistant metal or alloy. Impregnation of the refractory metal compound, by the metal or alloy in the molten state, as well as mixing the refractory compound and metal or alloy in powdered form and processing the mixture by conventional powder metallurgy techniques, are to be used as methods of manufacture. A review of work done during the periods covered by previous reports is given.

Final and summary report. Apr 1952. 59p photos, graphs, tables Microfilm $2.75, Photostat $7.50. PB 109766

It was found that, among the materials tested, titanium carbide-Inconel, infiltrated by the capillary infiltration method, had the most favorable combination of high-temperature strength, ductility, and oxidation resistance at elevated temperatures. AAF WADC TR 52-92.

Investigation of the effects of various thermal treatments and types of electrodes on the ductility of welded joints in silicon-killed steels, by Angelo J. Martini. Jun 1950. 83p photos, drawings, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 110505

The quality of welds made in two types of $\frac{1}{2}$-in. silicon-killed steel plate, different in chemical composition and microstructure, was evaluated to determine the effects of several different thermal treatments on the ductile behavior of these welded steels at low temperatures, and to compare the effect on the quality of the welded joints of low-hydrogen and cellulose-coated electrodes with and without controlled preheating postheating, and thermal stress-relief heat treatment. Thesis-Rensselaer Polytechnic Institute.

Liquid phase sintering. Final report under Contract no. AF33(038)-11865, by F. V. Lenel and H. S. Cannon. Rensselaer Polytechnic Institute. Powder Metallurgy Laboratory, Troy, N. Y. Jul 1951. 63p photos, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. PB 110475

A comprehensive review of all the liquid-phase sintering research under Lenel's guidance has been made. From all these data, a hypothesis has been developed which explains liquid-phase densification in terms of the movement of voids to the outside surface and the factors which retard this movement.

Macroscopichescoye opredeleniye vodoroda b tverdoi stali (Macroscopic determination of hydrogen in solid steels), by E. V. Podoliskaya and E. G. Shumovskii. Translated by I. C. Lecompte, edited by F. A. Raven. Jun 1953. 11p photos, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109902

Translated from Zavodskaya Laboratoriya, no. 2, 1950, p. 168-173.
1. Hydrogen - Determination - Russia 2. Steel - Hydrogen content - Russia 3. NAVSHIPS T 527 4. STS 171.

Metallography of an iron aluminum alloy prepared by electrical resistance sintering, by David Street. Jan 1949. 32p photos, drawings, diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 110483

An investigation of an iron-aluminum alloy, produced by the electrical resistance sintering of a mixture of pure powders, was made in order to observe the changes in microstructure and in other properties of the compacts, which occur with increasing heat input during sintering. Thesis-Rensselaer Polytechnic Institute.

Paramagnetic resonance absorption in two sulfates of copper, by Robert D. Arnold and Arthur F. Kip. Massachusetts Institute of Technology. Research Laboratory of Electronics. Nov 1948. 15p diagr, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109979

Resonance absorption measurements in $CuSO_4.5H_2O$ and $CuK_2(SO_4)_2.6H_2O$ exhibit dissimilarities caused by different degrees of exchange coupling between paramagnetic ions. In the single salt, in which the ions are more closely spaced, exchange coupling causes the absorption lines to be much narrower than would be predicted on the basis of ordinary magnetic dipolar broadening, and causes the appearance of a single line in cases where two lines should otherwise be found. Neither of these effects is observed in the double salt. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 61.

Pressure dependence of resistance of germanium, by Julius H. Taylor. Pennsylvania. University, Philadelphia, Pa. Sep 1950. 29p drawing, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109761

A general theory is presented for calculating the value of the pressure coefficient of resistance for pure materials from that measured with impure samples. Experimental observations were made of germanium with an improved apparatus which is shown in an included drawing. Measurements of the conductivity for changes of pressure in the region between 1000 and 5000 psi are described. The observed value of the pressure coefficient of resistance was calculated by a described method. Relevant data are included in tables and graphs. Contract NObsr-42487. Technical report no. 22.

Secondary aluminum industry in the U.S.A. Report of the Technical Assistance Mission no. 19. Organisation for European Economic Co-operation, Paris. 1952. 103p photos, diagrs, tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $2.50. PB 110628

1. Aluminum industry 2. OEEC TAR 19.

Some magnetic properties of ferrite-permalloy mixtures, by Norman F. Hopson. Jun 1949. 57p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 110485

Compositions were made containing 10 to 90% ferrite by weight. The mixtures were compacted in a steel die and sintered for 12 hours at 1100°C. Samples of pure ferrite, prepared in the ball mill and colloid mill, were also pressed and sintered. The samples were wound with primary and secondary windings and the magnetic properties were determined by the ballistic ring method and an electronic method using an oscilloscope. Optimum characteristics were obtained with a sample containing 70% Snock ferrite. Thesis-Rensselaer Polytechnic Institute.

Structural efficiencies of various aluminum, titanium, and steel alloys at elevated temperatures, by George J. Heimerl and Philip J. Hughes. U. S. National Advisory Committee for Aeronautics. Jul 1953. 16p graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110708

1. Aluminum alloys - Heat treatment 2. Titanium alloys - Heat treatment 3. Steel alloys - High temperature tests 4. Steel plates - High temperature tests 5. Heating, Aerodynamic 6. Flow, Supersonic - Theory 7. NACA TN 2975.

Structure studies of nickel zinc ferrite during the sintering cycle by X-ray diffraction, by John F. Clark. Jun 1949. 84p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 110487

The raw materials (zinc oxide, nickel oxide, and ferric iron oxide) were mixed in a colloidal mill,

and isobutyl methacrylate was added. The sintering cycle consisted of a slow rate of heating and cooling; the sintering temperature was 1100°C. One specimen was cooled immediately upon reaching sintering temperature; other specimens were sintered for periods from 2 to 100 hours. X-ray diffraction studies were made on the raw materials, the unsintered mixture, and each sintered specimen. Thesis-Rensselaer Polytechnic Institute.

Studies on the solidification and contraction in steel castings: Contraction stresses, by C. W. Briggs. U. S. Naval Research Laboratory. Apr 1937. 24p photo, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75.
PB 109585

1. Steel castings - Contraction 2. Steel castings - Stresses 3. Steel castings - Thermal properties 4. NRL M-1355.

Surface impedance of metals, by W. B. Nowak. Massachusetts Institute of Technology. Research Laboratory of Electronics. May 1949. 148p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $5.75, Photostat $18.75.
PB 110566

A brief summary of the Reuter and Sondheimer theory is given, with emphasis on the assumptions involved and conclusions reached. A brief account is given of Morgan's theory of the influence of surface roughness on surface losses, and an approximate "correction" to the data is applied on the basis of this theory with some additional assumptions. Some discussion is given of the measurement techniques, and the surface preparation. Contract W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. Identical with a thesis of same title. MIT REL TR 97.

Ultrasonics applied to solidification and solid-state transformation, by J. Byron Jones. Aeroprojects, Inc., West Chester, Pa. Oct 1951. 80p photos, drawings, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.50, Photostat $10.00.
PB 110465

Ultrasonic energy was applied to 24S and 75S aluminum alloys after solution heat treatment, and the effect on age hardening evaluated, primarily by means of Rockwell hardness readings, and tensile tests. Tht effects were small and indicate that high intensity elastic energy retards precipitation hardening. Grain refinement was accomplished and sounder ingots resulted from the use of ultrasonics. Zirconium sponge was alloyed with pure magnesium by the application of ultrasonics. Contract no. AF33(038)-11208. Contents: Part I: Solid state transformation tests on aluminum alloys. Part II. Solidification tests on pure magnesium, pure zinc, and magnesium alloys. - Appendix I. Ultrasonic transmission into molten metals. - Appendix II. Thermal conductivity barium titanate. - Bibliography. AAF TR 6675.

Use of 8-hydroxquinoline for the fluorimetric determination of aluminum in steel, by Warren H. McMullen. Jun 1950. 33p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00.
PB 110501

Fluorimetric quantitative determination of aluminum of low concentration is accomplished by use of a fluorimeter which employs two photocells to measure the fluorescence. The reagent used was 8 Hydroxyquinoline, which forms an aluminum quinolate giving a green fluorescence when irradiated with ultraviolet light. The full intensity of fluorescence occurs immediately, and the potentiometer reading is proportional to the degree of fluorescent light. This method has a sensitivity of better than 1 part in 1,000,000. Thesis-Rensselaer Polytechnic Institute.

X-ray investigation of the structure and lattice parameters of magnesium-lithium-aluminum ternary alloys at room temperature and at 600°F, Raymond J. Towner. Jan 1950. 39p graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00.
PB 110478

Wire specimens etched down to a diameter between 0.25 and 0.10 mm from extruded rod were found to be suitable for conducting investigations up to 600°F, and above approx 600°F, extruded specimens of alloy powder mixed with collodion should be used. The results indicate that aluminum added to magnesium slightly increases the c/a ratio, and reduced both a_o and c_o in the range of 4% aluminum. Thesis-Rensselaer Polytechnic Institute.

METEOROLOGY AND CLIMATOLOGY

Measurement of humidity. Gt. Brit. National Physical Laboratory. 1953. 23p drawings, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.30.
PB 110670

S. O. code no. 48-120-4.
1. Humidity - Measurements - Gt. Brit. 2. DSIR NPL NAS 4.

Micrometeorology of the surface layer of the atmosphere. Interim report no. 16, Oct 1, 1951 to Dec 31, 1951, under Contract no. W28-099-ac-378. Johns Hopkins University. Laboratory of Climatology, Seabrook, N. J. Dec 1951. 95p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $4.25, Photostat $12.50.
PB 110508

For 18th report see PB 108159. For index to no. 1-18 see PB 108128. Section II contains "Computing evaporation using turbulent transport equations", by Robert R. Osborn, and "Theoretical derivation of an equation for potential evapotranspiration", by

Maurice H. Halstead.
1. Micrometeorology 2. Instruments, Meteorological - Design 3. Indicators, Dew-point - Design 4. Evaporation (Meteorology) - Theory 5. Evapotranspiration - Theory.

Project Cirrus. Final report under Contract no. DA36-039-sc-15345. Part I: Laboratory, field and flight experiments, prepared by Vincent J. Schaefer. General Electric Co. Research Laboratory, Schenectady, N. Y. Mar 1953. 179p photos, maps, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $6.50, Photostat $22.50. PB 110466

For Part II see PB 110467. Dept. of the Army project: 3-90-07-022. Signal Corps project: 24-172 B-O.
1. Clouds - Seeding 2. Ice crystals 3. Generators, Smoke 4. Respirators - Filters 5. SIG Contract DA36-039-sc-15345, Final report, Part I 6. GE RL 785 Part I.

MINERALS AND MINERAL PRODUCTS

Adsorption of ions on glass, by Harvey Briggs. Jan 1950. 50p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109829

The adsorption of phosphate ions, radioactivity labled with P^{32}, by various glasses is discussed, particularly with regard to the effect of concentration and the temperature on the amount adsorbed. A scintillation counter was used to measure the radioactivity. Equilibrium time was determined at different concentrations. Isotherns were established for Pyrex, boron-free and Vycor chemical ware. The amount of uptake as a function of temperature between 1 and 70°C is given for various concentrations on the glasses. Thesis-Rensselaer Polytechnic Institute.

Identification of certain clays by differential thermal analysis, by Dalton Hoskins and Richard I. Hudson. Jun 1950. 78p photos, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.50, Photostat $10.00. PB 109831

The effect of certain variable conditions, such as heating rate, mineral grain size, etc., on the differential thermal curves of the clay minerals Kaolinite, Bentonite, and Illite was determined, and standard characteristic thermal curves for these clay minerals were prepared. Thesis-Rensselaer Polytechnic Institute.

Metal-to-ceramic seals. Technical report no. 5 under Contract no. W33-038-ac-14538, prepared W. H. Christoffers, O. T. Purl, R. P. Wellinger. Illinois. Engineering Experiment Station, Electrical Engineering Research Laboratory, Electron Tube Section. Apr 1951. 25p photos, drawings, diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109856

1. Adhesives - Ceramic to metal 2. Furnaces, Vacuum - Design.

Preparation of reproducible barium titanate ceramics, by R. M. Callahan and J. F. Murray. U. S. Naval Research Laboratory. Jun 1953. 9p tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.25. PB 111188

The formulation involves a binder, lubricant, and wetting agent. The mixture must be thoroughly blended by water grinding, then dried, rewetted, granulated, pressed, and dried before firing. To insure smooth but complete escape of volatile constituents, the firing schedule involves a holding period just below the sintering temperature. This procedure results in excellent uniformity and an improvement to both physical and electrical properties. NRL R 4176.

Report on natural graphite, by Paul M. Tyler. National Research Council. Division of Engineering and Industrial Research. Minerals and Metals Advisory Board. Jun 1953. 50p diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. Limited supply available free from Minerals and Metals Advisory Board, National Research Council, Washington 25, D. C. PB 109911

Conclusions and recommendations reviewed and approved by the Graphite Panel, Minerals and Advisory Board.
1. Graphite - Production 2. Graphite industry 3. MMAB-44-C.

Report on possible utilization of phosphate rock slimes, by Paul M. Tyler and William H. Waggaman. National Research Council. Division of Engineering and Industrial Research. Minerals and Metals Advisory Board. Jun 1953. 144p diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $5.75, Photostat $18.75. Limited supply available free from Minerals and Metals Advisory Board, National Research Council, Washington 25, D. C. PB 109912

Recommendations reviewed and approved by the Phosphate Panel, Minerals and Metals Advisory Board.
1. Phosphate industry 2. Phosphate ores - Uses 3. MMAB-45-C.

ORDNANCE AND ACCESSORIES

Antenna radiation patterns of KUW-1 missile, by Maxime G. Kaufman. U. S. Naval Research Laboratory. Jan 1948. 18p photos, drawings, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109750

Pulsed transmitter operating on 2625 Mc/s and a bolometer receiver in conjunction with automatic field-strength recording machine used to study radiation patterns of telemetering antenna of KUW-1 missile. From analysis of patterns for antenna on nose section or on stabilizer it is concluded that nose mounting offers better results from standpoint of pattern symmetry, angle coverage and shortened r-f feed line. NRL R-3214.

Comparison of calculated and measured base pressures of cylindrically based projectiles, by W. F. Cope. Gt. Brit. Ministry of Supply. Aeronautical Research Council. May 1952. 12p photo, drawings, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.55. PB 109810

Cover date is 1953. S. O. code no. 23-9007-18.
Appendix. - Calculation of Reynolds number effect on projectiles at supersonic speed, by W. F. Cope. Jul 1946.
1. Projectiles, Cylindrically based - Base pressures - Gt. Brit. 2. Projectiles - Air resistance - Gt. Brit. 3. Projectiles - Wind tunnel tests - Gt. Brit. 4. Pressure, Air - Measurements - Gt. Brit. 5. Wind tunnels, Supersonic - Pressure - Gt. Brit. 6. Reynolds number - Effect - Gt. Brit. 7. Mach number - Effect - Gt. Brit. 8. ARC CP 118.

Computation of the transonic flow over a wedge with detached shock wave by the method of steepest descent, by Joseph W. Fischbach. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Jan 1953. 56p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 109848

A numerical procedure for solution to the transonic flow over a wedge with a detached shock wave is given. The results of preliminary hand computation are presented which give the shape and location of the shockwave, the pressure acting on the wedge, the streamlines near the body, and the lines of constant velocity magnitude in the subsonic region. The procedure for obtaining a good initial approximation as well as the point by point transformation of numerical data from the physical plane to the hodograph plane and then back to the physical is given. APG BRL M642.

Determination of base pressure from free-flight data, by A. C. Charters and R. A. Turetsky. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Mar 1948. 24p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109842

1. Cones - Aerodynamics 2. Cones - Pressure distribution 3. Mach number - Effect 4. APG BRL R653.

Magnetic influence underwater ground mines: Development of detecting and control devices (a summary report). U. S. Office of Scientific Research and Development. Dec 1943. 22p photo, diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109629

Summarized from contractor's progress reports, particularly Union Switch and Signal Co. Final report under Contract OEMsr-328, Jul 23, 1943, and Gulf Research and Development Co. Final report under Contract OEMsr-266 (OSRD no. 1557) Sep 15, 1943.
1. Mines, Submarine - Detection 2. Mines, Submarine - Control devices 3. Mines, Magnetic 4. OSRD 1999 5. NDRC Div 17.1.

Microthermal structure of the ocean near Key West, Florida. Part II: Analysis, by R. J. Urick and C. W. Searfoss. U. S. Naval Research Laboratory. Apr 1949. 13p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109795

Analysis of some of the typical microthermal variations observed and reported in previous report. Records were obtained with sensitive thermopile mounted on a submarine underway in Key West waters. An estimate is given of some of the effects of the thermal microstructure on the propagation of sound in the ocean. For part I see PB 111134. NRL S-3444.

Supersonic flow past a cone and a wedge, by Richard N. Thomas. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Aug 1944. 11p diagr Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109841

Ordnance Research and Development Center project no. 3757.
1. Flow, Supersonic - Theory 2. APG BRL R483.

Transonic flow over a wedge with a detached shock wave, by Joseph W. Fischbach. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Jan 1953. 48p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.50, Photostat $6.25. PB 109843

1. Flow, Transonic - Theory 2. Hodographs 3. Equations, Differential 4. APG BRL R 803.

Vorticity in the supersonic flow about yawing cones, by Max Lotkin. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Aug 1948. 18p diagrs, graph, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109846

A comparison is made between Stone's and Sauer's methods of calculation of the supersonic flow about a slightly yawing cone. It is shown that the neglect of vorticity, while having only a small effect on the ratio of shock yaw to cone yaw, may lead to quite erroneous values of the normal force coefficient. APG BRL R 670.

PAPER AND ALLIED PRODUCTS

Case study data on productivity and factory performance: Pulp and paper mills. (Based on reports submitted by 18 selected pulp and paper mills). U. S. Bureau of Labor Statistics. Dec 1951. 67p photos, diagrs, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109996

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.
1. Paper mills - Productivity 2. Paper industry 3. Paper pulp - Production.

Pulp and paper industry in the U.S.A. Report by a mission of European experts. Organisation for European Economic Co-operation, Paris. 1951. 368p drawings, diagrs, map, graphs, tables Available from Columbia Unversity Press, 2960 Broadway, New York 27, N. Y. $6.00. PB 110627

1. Paper industry 2. Paper pulp - Production.

PHOTOGRAPHIC AND OPTICAL GOODS

Statistical optics. II: Mueller phenomenological algebra, by Nathan Grier Parke III. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jun 1949. 20p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110580

This report is expository and presents background and illustrative material from phenomenological optics. In particular, it gives the phenomenological definition of the Stokes vector. It also gives an elementary derivation of the relation between the Jones matrix and the Mueller matrix for a simple optical instrument. The use of the algebra is illustrated by computing the effect observed in the Langsdorf-DuBridge experiment. Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B. MIT RLE TR 119.

PHYSICS

General

Deviations from thermal equilibrium in shock waves, by H. A. Bethe and E. Teller. Michigan. University. Engineering Research Institute, Ann Arbor, Mich. n.d. 81p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.75, Photostat $11.25. PB 110496

1. Shock waves - Gases 2. Shock waves - Thermodynamics 3. Shock waves - Theory 4. Shock waves - Pressure 5. Shock waves - Velocity 6. Thermal equilibrium diagrams.

Eddy current losses in a conducting shaft rotating in a magnetic field, by N. H. Frank. Massachusetts Institute of Technology. Research Laboratory of Electronics. Nov 1946. 10p diagrs, graph Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 109959

The eddy current losses in a shaft rotating in a uniform magnetic field perpendicular to the shaft axis are calculated, when the shielding effect of the induced currents is included. Plots are given to show the increasing distortion of the magnetic field in and around the shaft with increasing ratio of radius to skin depth for the rotation frequency, for non-magnetic shaft material. Formulas are given for the case of magnetic shafts. Contract no. W36-039-sc-32037. MIT RLE TR 23.

New definition of a fluid. Part I: The Stokesian fluid, by C. A. Truesdell. U. S. Naval Research Laboratory. Apr 1949. 15p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109783

This paper forms a part of a program to derive correct aerodynamic equations for moderately rarefied atmospheres, such as those at altitudes of 20,000 to 100,000 feet. The basic ideas of the author's theory of fluid dynamics are here illustrated with a simple example, the Stokesian Fluid. While this model does not represent all the effects encountered in rarefied atmospheres, it exemplifies the method of development of the theory without elaborate calculations, and enables a discussion of some of the typical phenomena. NRL P-3457.

Progress report no. 13 under O.N.R. Contracts N5ori-07801 and N5ori-07858. Massachusetts Institute of Technology. Laboratory for Insulation Research. Jun 1953. 54p photos, drawings, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 109929

1. Dielectric research 2. Crystallography, X-ray 3. Ferromagnetism - Research 4. Organic binary systems 5. Crystals - Growth.

Table of binomial coefficients, by M. Lotkin and M. E. Young. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Mar 1953. 35p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.25, Photostat $5.00. PB 109850

1. Tables, Mathematical 2. Coefficients, Binomial 3. APG BRL M652.

Small deformations of a plastic-rigid body at the yield point, by E. T. Onat. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Jun 1953. 30p diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110510

Contract N7onr-35801, T. O. I, NR-041-032.
1. Plastic deformation - Theory 2. Mathematical equations and solutions 3. GDAM A11-90/21 4. GDAM TR 90.

Table of $\log_2 \frac{1}{p}$, $p.\log_2 \frac{1}{p}$ and $p.\log_2 \frac{1}{p} + (1-p).\log_2 \frac{1}{1-p}$, by Ladislav Dolansky and Marie P. Dolansky. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jan 1952. 25p graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110608

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 8-102B-O.
1. Logarithms 2. SIG Contract DA36-039-sc-100 3. MIT RLE TR 227.

Tables of the function $e^{-az}/\Gamma\, M(\alpha:\gamma:z)$, by A. D. MacDonald. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jul 1949. 12p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 110519

Contract no. W36-039-sc-32037. Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Tables, Mathematical 2. Hypergeometric functions 3. SIG Contract W36-039-sc-32037 4. MIT RLE TR 130.

Nuclear

New "double resonance" method for the investigation of atomic and nuclear moments. Part I: Theory of effects in mercury vapor, by F. Bitter and J. Brossel. Massachusetts Institute of Technology. Research Laboratory of Electronics. Sep 1950. 26p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110533

Dept. of the Army project no. 3-99-10-022. Signal Corps project no. 102B.
1. Resonance, Electromagnetic 2. Radiation, Electromagnetic - Absorption - Measurement 3. Nuclear reactions - Mathematical analysis 4. Nuclear structure - Theory 5. Mercury - Isotopes - Magnetic resonance 6. SIG Contract W36-039-sc-32037 7. MIT RLE TR 176.

Study of phase transitions by means of nuclear magnetic resonance phenomena, by Nelson L. Alpert. Massachusetts Institute of Technology. Research Laboratory of Electronics. Jul 1948. 22p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 110553

Condensation of a thesis.
1. Nuclear reactions 2. Nuclei - Magnetic moments 3. SIG Contract W36-039-sc-32037 4. MIT RLE TR 76

PSYCHOLOGY

Evaluation of difficulty of task under several different conditions of performance on the modified Mashburn apparatus, by Jack A. Adams. Iowa State University, Iowa City, Iowa. n.d. 28p graphs, tables Available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 111197

Contract N5ori-57, T. O. II, Project NR-783-002. SDC Human engineering project 20-M-1. Difficulty of task was evaluated under six different conditions of performance on the modified Mashburn apparatus. Twelve different measures or indices of relative difficulty were considered, six of them relating to the data on number of matches and six of them relating to error-match ratios. The analyses showed that no single measure was completely adequate to reveal the relative difficulty of the six tasks. Performance data are summarized in graphs. SDC TR 57-2-8.

Periodic status report XX1, period 15 Nov 1952-15 May 1953, under Contract N5ori-76, Project NR 142-201. Harvard University. Psycho-Acoustic Laboratory. May 1953. 24p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109618

Contains list of PNR reports (no. 1-138) issued under this contract.
1. Psychoacoustics - Research 2. PNM-51.

Psychophysical research. Summary report, 1946-1952, edited by E. P. Reese, with T. W. Reese,

J. Volkmann, H. H. Corbin. Mount Holyoke College. Psychophysical Research Unit, South Hadley, Mass. Jan 1953. 197p photos, drawings, diagrs, graphs, tables Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $2.00. PB 111195

Contract Nonr-131(01), formerly under Contract N5-ori-166, Task order I.
1. Visual perception - Tests 2. Psychological tests 3. SDC TR 131-1-5 4. NAVEXOS P-1104.

Retroactive facilitation and interference in performance on the modified two-hand coordinator, by Don Lewis and Paul N. Smith. Iowa State University, Iowa City, Iowa. Dec 1951. 21p photo, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 108894

Contract Nonr-166(00), Project NR-783-002. SDC Human engineering project 20-M-1e.
1. Psychology, Applied 2. Psychomotor tests 3. Coordination tests 4. SDC TR 166-00-2.

Studies in the accuracy of movement. I: Bisection and duplication of linear extents in the horizontal sagittal plane, by S. D. Spragg, D. B. Devoe, A. L. Davidson. Rochester. University. Dept. of Psychology. Oct 1949. 22p photo, drawing, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109020

Contract N6onr-241, T. O. 6, Project NR-783-006. SDC Human engineering project 20-M-1-d.
1. Psychomotor tests 2. SDC TR 241-6-1.

STRUCTURAL ENGINEERING

Diffusion of load into a panel bounded by constant stress booms and a transverse beam, by E. H. Mansfield. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Aug 1948. 12p diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.90. PB 110681

Cover date is 1953. S. O. code no. 23-2729.
1. Panels, Stiffened - Stresses - Gt. Brit. 2. Beams, Transverse - Stresses - Gt. Brit. 3. Shear stress - Measurement - Gt. Brit. 4. Loads, Transverse - Distribution - Gt. Brit. 5. ARC RM 2729.

Fire resistance of board and joist floors for small houses and flats. Gt. Brit. Dept. of Scientific and Industrial Research. Building Research Station, Watford, England. May 1943. 4p photo, diagrs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.10. PB 110671

S. O. code no. 72-22-0-54.
1. Floors, Wood - Fire resistance - Gt. Brit. 2. DSIR BRD 54.

Study of conservation in building construction, part II, second year: Implementation of the 1952 recommendations. Final report. Building Research Advisory Board. Jun 1953. 221p Available from Building Research Advisory Board, National Academy of Sciences, 2101 Constitution Ave., Washington 25, D. C. PB 109928

For Part I see PB 111006.
1. Building materials - Conservation 2. Buildings - Construction.

Temperatures, thermal stress, and shock in heat-generating plates of constant conductivity and of conductivity that varies linearly with temperature, by S. V. Manson. U. S. National Advisory Committee for Aeronautics. Jul 1953. 62p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110712

1. Stresses, Thermal - Theory 2. Plates, Heat-generating - Thermal stress 3. Plates, Heat-generating - Temperature distribution 4. Heat - Transference - Aerodynamics 5. Thermal conductivity - Theory 6. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 7. NACA TN 2988.

TEXTILES AND TEXTILE PRODUCTS

Case study data on productivity and factory performance: Coarse cotton gray goods. (Based on reports submitted by 16 selected mills). U. S. Bureau of Labor Statistics. Mar 1953. 112p photos, diagrs, graph, tables Available from U.S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109999

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.
1. Cleaning cloths - Production 2. BLS 16.

Mechanical conditioning of textile fibers, by George Susich. U. S. Office of the Quartermaster General. Research and Development Division. Textiles, Clothing and Footwear Branch. Jun 1953. 60p photos, diagrs; graphs, tables (1 fold) Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.50. PB 111191

This report presents data on 16 fibers subjected to a rather severe stretching procedure. The samples, representing practically every type of textile fiber, were investigated in the form of single fibers, multifilaments and staple yarns. Their tensile properties, including their elastic recovery after deformation are compared with their original properties. The structural changes which remain in fibers after the deforming force is removed are also discussed in the report. QMC TSR 82.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Analysis of the power-off landing maneuver in terms of the capabilities of the pilot and the aerodynamic characteristics of the airplane, by Albert E. von Doenhoff and George W. Jones, Jr. U. S. National Advisory Committee for Aeronautics. Aug 1953. 42p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110741

1. Airplanes - Maneuverability 2. Airplanes - Safety devices and measures 3. Airplanes - Landing 4. Landing fields - Length 5. Pilots, Air - Decision-time measurement 6. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 7. NACA TN 2967.

Application of the polygon method to the calculation of the compressible subsonic flow round two-dimensional profiles, by L. C. Woods. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1952. 31p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.70. PB 109808

Cover date is 1953. S. O. code no. 23-9007-15.
1. Airfoils, Two-dimensional - Flow - Gt. Brit. 2. Airfoils, Two dimensional - Lift coefficient - Gt. Brit. 3. Airfoils, Two dimensional - Velocity distribution - Gt. Brit. 4. Flow, Subsonic - Theory - Gt. Brit. 5. Flow, Compressible - Gt. Brit. 6. Goldstein's "Approximation III" (Aerodynamics) - Gt. Brit. 7. Polygon method (Aerodynamics) - Gt. Brit. 8. Mathematics, Applied - Aerodynamics - Gt. Brit. 9. ARC CP 115.

Charts of the wave drag of wings at zero lift, by T. Lawrence. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Nov 1952. 22p diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.90. PB 109809

Cover date is 1953. Technical Note no. Aero 2139, Revised. S. O. code no. 23-9007-16.
1. Wings - Drag - Theory - Gt. Brit. 2. ARC CP 116.

Drag of finite-length cylinders determined from flight tests at high Reynolds numbers for a Mach number range from 0.5 to 1.3, by Clement J. Welsh. U. S. National Advisory Committee for Aeronautics. Jun 1953. 12p photo, diagr, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109641

1. Reynolds number - Effect 2. Mach number - Effect 3. Cylinders, Circular - Drag 4. NACA TN 2941.

Effect of compressibility on the attitude of aircraft in rectilinear flight, by K. J. Lush. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Mar 1948. 7p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 110682

Cover date is 1953. S. O. code no. 23-2776.
1. Lift coefficient - Gt. Brit. 2. Airplanes - Lift Theory - Gt. Brit. 3. Airplanes - Flight paths - Gt. Brit. 4. Flight characteristics - Gt. Brit. 5. Flow, Compressible - Velocity distribution - Gt. Brit. 6. Wings - Lift - Gt. Brit. 7. ARC RM 2776.

Effect of slipstream on the longitudinal stability of multi-engined aircraft, by D. E. Morris and J. C. Morrall. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Nov 1948. 9p diagr, graphs, tables (1 fold) Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 110680

Cover date is 1953. S. O. code no. 23-2701.
1. Stability, Longitudinal - Tests - Gt. Brit. 2. Airplanes - Slipstream - Gt. Brit. 3. ARC RM 2701.

Estimation of forces and moments due to rolling for several slender-tail configurations at supersonic speeds, by Percy J. Bobbitt and Frank S. Malvestuto, Jr. U. S. National Advisory Committee for Aeronautics. Jul 1953. 71p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110707

1. Wings, Triangular - Aspect ratio 2. Wings, Triangular - Rolling moments 3. Wings, Rotating - Theory 4. Stability, Lateral - Dynamic tests 5. Damping derivatives - Stability 6. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 7. NACA TN 2955.

Flight investigation of the effect of steady rolling on the natural frequencies of a body-tail combination, by Norman R. Bergrun and Paul A. Nickel. U. S. National Advisory Committee for Aeronautics. Aug 1953. 27p photo, drawings, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110764

1. Stability, Longitudinal - Static tests 2. Stability, Lateral - Statis tests 3. Airplanes - Spinning - Tests 4. Airplanes - Rolling - Tests 5. Tail surfaces - Stability 6. Tail surfaces - Rolling moment coefficient 7. U. S. Ames Aeronautical Laboratory, Moffett Field, Calif. 8. NACA TN 2985.

High-speed planing characteristics of a rectangular flat plate over a wide range of trim and wetted length, by Irving Weinstein and Walter J. Kapryan. U. S. National Advisory Committee for Aeronautics. Jul 1953. 29p photo, drawing, diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110710

1. Hydrodynamics - Theory 2. Planing surfaces - Hydrodynamics 3. Plates, Flat - Aerodynamics 4. Seaplanes - Hulls - Length-beam ratio 5. Seaplanes - Hulls - Planing surfaces 6. Seaplanes - Hydrodynamics 7. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 8. NACA TN 2981.

High-speed tunnel tests of a five per cent. chord dive-recovery flap on a NACA 0015 aerofoil, by D. A. Clarke. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1948. 19p diagr, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N.Y. $1.25. PB 110678

Cover date is 1953. S. O. code no. 23-2689.
1. Flaps, Aircraft - Dive-recovery - Wind tunnel tests - Gt. Brit. 2. Airfoils - Wind tunnel tests - Gt. Brit. 3. NACA 0015 (Airfoil) - Gt. Brit. 4. ARC RM 2689.

Low speed performance of a helicopter, by A. L. Oliver. Gt. Brit. Ministry of Supply. Aeronautical Research Council. May 1952. 12p graphs (1 fold) Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 110675

Cover date is 1953. Report no. A.A.E.E./Res/264. S. O. code no. 23-9007-22.
1. Helicopters - Performance - Gt. Brit. 2. ARC CP 122.

Impingement of water droplets on wedges and diamond airfoils at supersonic speeds, by John S. Serafini. U. S. National Advisory Committee for Aeronautics. Jul 1953. 62p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110459

1. Drops, Liquid - Impingement on airfoils 2. Ice formation - Meteorological analysis 3. Equations of motion 4. Flow, Supersonic - Theory 5. NACA TN 2971.

Methods for the ultimate dissipation of heat orginating with airborne electronic equipment, by W. Robinson and R. H. Zimmerman. Ohio State University Research Foundation, Columbus, Ohio. Mar 1951. 105p diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $4.50, Photostat $13.75. PB 109113

General performance data are given on bases of detailed studies previously performed. Principally, seven methods are considered applicable, depending on the design and operation of aircraft and installation requirements. They are: 1) air cooling by use of blowers, 2) ram air cooling, 3) expanded ram air cooling, 4) air cooling by flush skin heat exchangers, 5) heat dissipation to fuel, 6) heat dissipation to expendable evaporative coolants; and 7) heat dissipation by radiation to space. The characteristic features of the methods and systems are compared qualitatively and presented in a table which indicates the range of applicability of each system. Contract W33-039-ac-14987. AAF TR 6493.

Pressure distributions about finite wedges in bounded and unbounded subsonic streams, by Patrick L. Donoughe and Ernst L. Prasse. U. S. National Advisory Committee for Aeronautics. May 1953. 41p photos, diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N.W., Washington 25, D. C. PB 109663

1. Flow, Subsonic 2. Boundary layer, Laminar - Pressure gradients 3. Mach number - Effect 4. Karman-Tsien method 5. NACA TN 2942.

Preview of eighteen volumes of the rotary wing aircraft handbooks and history project, prepared by Prewitt Aircraft Co. for Headquarters, Air Materiel Command, Wright Field, Dayton, Ohio., edited by Eugene K. Liberatore. May 1950. 93p photos, drawings, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $4.25, Photostat $12.50. PB 110454

Contract W33-038-ac-21804.
1. Helicopters - History 2. Helicopters - Design 3. Aerodynamics - Theory 4. Vibration - Theory 5. Aircraft - Patents 6. Aircraft - Weights 7. Rotor blades 8. Wings, Rotating.

Royal Aircraft Establishment 4ft x 3ft experimental low turbulence wind tunnel, part I: General flow characteristics, by H. B. Squire and K. G. Winter. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Feb 1948. 28p photos, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.70. PB 110679

Cover date is 1953. S. O. code no. 23-2690.
1. Wind tunnels - Turbulence - Gt. Brit. 2. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 3. ARC RM 2690.

Supersonic flow past oscillating airfoils including nonlinear thickness effects, by Milton D. Van Dyke. U. S. National Advisory Committee for Aeronautics. Jul 1953. 41p diagrs, graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110711

1. Flow, Supersonic - Theory 2. Airfoils, Oscillating - Aerodynamics 3. Airfoils - Thickness

4. Airfoils - Flutter - Theory 5. Airfoils - Pressure distribution 6. Airfoils - Lift coefficient 7. Airfoils - Pitching moments 8. Damping derivatives - Stability 9. U. S. Ames Aeronautical Laboratory, Moffett Field, Calif. 10. NACA TN 2982.

Wind-tunnel tests of the stalling properties of an 8 per cent thick symmetrical section with nose suction through a porous surface, by R. C. Pankhurst, W. G. Raymer and A. N. Devereux. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jun 1948. 4p drawings, diagrs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 110676

Cover date is 1953. S. O. code no. 23-2666.
1. Noses (Aircraft) - Wind tunnel tests - Gt. Brit. 2. Airfoils, Symmetrical - Leading edges - Gt. Brit. 3. Airfoils, Suction - Materials - Gt. Brit. 4. Airfoils, Symmetrical - Stalling - Gt. Brit. 5. Airfoils, Symmetrical - Wind tunnel tests - Gt. Brit. 6. ARC RM 2666.

Instruments

Techniques for calculating parameters of nonlinear dynamic systems from response data, by Benjamin R. Briggs and Arthur L. Jones. U. S. National Advisory Committee for Aeronautics. Jul 1953. 47p diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110709

1. Parameters, Differential 2. Parameters, Stability 3. Equations, Non-linear 4. Mathematics, Applied - Aerodynamics 5. Controls, Automatic - Operation 6. Stability, Dynamic - Theory 7. U. S. Ames Aeronautical Laboratory, Moffett Field, Calif. 8. NACA TN 2977.

Engines and Propellers

Determination of the natural frequencies of a full-scale airframe-engine system by the admittance method, by J. R. Forshaw and F. T. Mountford. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jul 1948. 24p photos, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.50. PB 110677

Cover date is 1953. S. O. code no. 23-2667.
1. Engines, Aircraft - Vibration - Gt. Brit. 2. Engines, Aircraft - Mounts - Tests - Gt. Brit. 3. Propellers - Vibration - Tests - Gt. Brit. 4. Torque, Propeller - Measurement - Gt. Brit. 5. Harmonic analysis - Gt. Brit. 6. ARC RM 2667.

Aerodynamics

Aerodynamic characteristics of an aspect-ratio-20 wing having thick airfoil sections and employing boundary-layer control by suction, by Bennie W. Cocke, Jr., Marvin P. Fink and Stanley M. Gottlieb. U. S. National Advisory Committee for Aeronautics. Aug 1953. 63p photos, drawings, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110743

1. Wings - Aerodynamics - Theory 2. Wings - Aspect ratio 3. Wings - Lift 4. Wings - Boundary layer 5. Flaps, Aircraft - Trailing edges 6. Mach number - Effect 7. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 8. NACA TN 2980.

Comparison of secondary flows and boundary-layer accumulations in several turbine nozzles, by Milton G. Kofskey, Hubert W. Allen and Howard Z. Herzig. U. S. National Advisory Committee for Aeronautics. Aug 1953. 58p photos, drawings, diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110765

1. Flow, Subsonic - Theory 2. Flow, Supersonic - Theory 3. Flow, Turbulent - Theory 4. Turbines, Axial - Flow 5. Cascades (Aerodynamics) - Theory 6. Boundary layer - Measurement 7. U. S. Lewis Flight Propulsion Laboratory, Cleveland, Ohio 8. NACA TN 2989.

Experiments with static tubes in a supersonic airstream, part I and II, by D. W. Holder, R. J. North and A. Chinneck. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jul 1950. 14p photos, diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 110684

Cover date is 1953. S. O. code no. 23-2782.
1. Mach number - Effect - Gt. Brit. 2. Reynolds number - Effect - Gt. Brit. 3. Wind tunnels, Supersonic - Tests - Gt. Brit. 4. Pitot-static tubes - Wind tunnel tests - Gt. Brit. 5. Shock waves - Pressure - Airplanes - Gt. Brit. 6. ARC RM 2782.

Reflection of a weak shock wave from a boundary layer along a flat plate. U. S. National Advisory Committee for Aeronautics. Order separate parts described below from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C.

I: Interaction of weak shock waves with laminar and turbulent boundary layers analyzed by momentum-integral method, by Alfred Ritter and Yung-Huai Kuo. Jan 1953. 66p diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 108667

1. Flow, Mixed - Theory 2. Flow, Supersonic - Theory 3. Flow, Laminar - Theory 4. Flow, Turbulent - Theory 5. Plates, Flat - Boundary layer, Laminar 6. Linear systems - Computing methods 7. Equations, Integral 8. Shock waves - Reflections 9. Mathematics, Applied - Aerodynamics 10. Cornell University. Graduate

School of Aeronautical Engineering, Ithaca, N. Y. 11. NACA TN 2868.

II: Interaction of oblique shock wave with a laminar boundary layer analyzed by differential-equation method, by Yung-Huai Kuo. Jan 1953. 60p graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N.W., Washington 25, D. C. PB 108637

1. Plates, Flat - Boundary layer, Laminar 2. Equations, Differential 3. Shock waves - Reflection 4. Flow, Mixed - Theory 5. Flow, Supersonic - Theory 6. Flow, Laminar - Theory 7. Flow, Turbulent - Theory 8. Cornell University. Graduate School of Aeronautical Engineering, Ithaca, N. Y. 9. NACA TN 2869.

La similitudine aria-acqua e lo studio dei modelli idraulici (Air-water analogy and the study of hydraulic models), by Giulio Supino. Translated by R. H. Cramer. Jul 1953. 22p graphs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110457

Translated from L'Energia Elettrica, vol. 28, no. 11, Nov 1951.
1. Flow, Hydrodynamic - Analogies - Italy 2. Aerodynamics - Theory - Italy 3. Hydrodynamics - Theory - Italy 4. Airplanes - Models - Italy 5. Models, Hydraulic - Italy 6. U. S. National Advisory Committee for Aeronautics 7. NACA TM 1359.

Study of the stability of the incompressible laminar boundary layer on infinite wedges, by Neal Tetervin. U. S. National Advisory Committee for Aeronautics. Aug 1953. 41p diagrs, graphs, tables Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 110742

1. Boundary layer, Laminar - Incompressible 2. Flow, Laminar - Theory 3. Equations, Differential 4. Schlichting theory 5. Reynolds number - Effect 6. Wedges - Pressure distribution 7. U. S. Langley Aeronautical Laboratory, Langley Field, Va. 8. NACA TN 2976.

Tables of complete downwash due to a rectangular vortex, computed by the staff of the Mathematical Division, N.P.L. Preface by V. M. Falkner. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jul 1947. 18p diagr, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.25. PB 109804

Cover date is 1953. S. O. code no. 23-2461.
1. Wings - Lift - Gt. Brit. 2. Wings - Loading - Gt. Brit. 3. Wings - Downwash - Gt. Brit. 4. Lattice sums - Gt. Brit. 5. Vortex motion - Theory - Gt. Brit. 6. Mathematics, Applied - Aerodynamics 7. Tables, Mathematical - Gt. Brit. 8. ARC RM 2461.

Toepler schlieren apparatus, by D. W. Holder and R. J. North. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Apr 1950. 13p photos, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 110683

Cover date is 1953. S. O. code no. 23-2780.
1. Schlieren method - Gt. Brit. 2. Shock waves - Photography - Gt. Brit. 3. ARC RM 2780.

Use of influence factors in problems of fluid flow, by K.H.V. Britten. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Apr 1947. 13p diagrs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00. PB 109803

Cover date is 1952. S. O. code no. 23-2441.
1. Flow, Fluid - Theory - Gt. Brit. 2. Flow, Compressible - Flow - Gt. Brit. 3. Flow, Incompressible - Theory - Gt. Brit. 4. Flow, Two dimensional - Theory - Gt. Brit. 5. Thom's formula (Aerodynamics) - Gt. Brit. 6. Green's function - Gt. Brit. 7. ARC RM 2441.

Visualization study of secondary flows in cascades, by Arthur G. Hansen, Howard Z. Herzig and George R. Costello. U. S. National Advisory Committee for Aeronautics. May 1953. 93p photos, diagrs Available from National Advisory Committee for Aeronautics, 1724 "F" St., N. W., Washington 25, D. C. PB 109581

1. Flow, Viscous 2. Cascades (Aerodynamics) 3. Boundary layer - Aerodynamics 4. NACA TN 2947.

Land Transportation

Case study data on productivity and factory performance: School bus bodies. (Based on reports submitted by six selected plants). U. S. Bureau of Labor Statistics. Feb 1952. 117p photos, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109997

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.
1. Motor buses, School - Bodies - Production.

Development of a new "Jeep-Class" foam fire-fighting vehicle, by R. L. Tuve, R. R. Neill, H. B. Peterson, E. J. Jablonski, J. C. Burnett, R. L. Gipe, and J. W. Porter. U. S. Naval Research Laboratory. May 1953. 29p photos, drawings, diagr, table Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $.75. PB 111175

Definite design and mechanical advantages accure when positive-displacement pumps generate foams in situ and deliver them fully homogenized under pressure to distributing nozzles capable of instant variation in foam pattern. The mobility and ease of activation which could be realized from a foam-generating system mounted on a "Jeep-class"

vehicle led to the design of a system capable of completely independent operation. This method produces 1100 gpm of foam and uses water from a 240-gallon tank at a rate of 100 gpm. NRL R 4138.

Effect of tinted windshields and vehicle headlighting on night visibility. Presented at the thirty-second annual meeting, January 13-16, 1953. Highway Research Board. 1953. 66p diagrs, graphs, tables Available from Highway Research Board, National Research Council, 2101 Constitution Ave., Washington 25, D. C. $.90. PB 109897

Bulletin 68. National Research Council Publication 259. Contents: Effect of tinted windshields on nighttime-visibility distances, by Warren Heath and D.M. Finch. - Nighttime seeing through heat-absorbing windshields, by Val J. Roper. - Development of the guide "Autronic eye", by G. W. Onksen. - Design of the meeting beam of the automobile headlight, by A. J. Harris. - Glare from passing beams of automobile headlights, by Geoffrey Grime.

Railroads in the U.S.A. Report by a group of European experts. Organisation for European Economic Co-operation, Paris. 1952. 413p photos, diagrs, drawings (1 fold), tables (part fold) Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $9.00. PB 110624

Technical assistance mission no. 12.
1. Railroads 2. OEEC TAR 14.

Marine Transportation

Breconshire, un ricupero eccezionale (The Breconshire, an exceptional salvage operation), by Giuseppe Caputi. Translated by F. Rizzo. Mar 1953. 13p photos Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109159

Translated from Il Timone, bi-weekly newspaper of the Italian merchant marine, Jan 10-17, 1953, p. 3.
1. Breconshire (Tanker) 2. Ships - Salvage - Italy 3. NAVSHIPS T522.

Considerations of welded hatch corner design. Ship Structure Committee. Oct 1952. 14p drawings, table Available from Secretary, Ship Structure Committee, U. S. Coast Guard Headquarters, Washington 25, D. C. PB 109212

1. Hatches - Design 2. NAVSHIPS SSC 37.

Development of wax ship model manufacturing at the David Taylor Model Basin, by R. B. Couch. U. S. David W. Taylor Model Basin, Washington, D. C. Prepared for the 1950 American Towing Tank Conference at Ottawa, Canada. Aug 1950. 19p photos, drawing, graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 108858

1. Ship models, Wax - Manufacture 2. DWTMB 728.

Instruction manual for the operation and maintenance of the Hall-Scott Defender twelve cylinder marine engine. U. S. Bureau of Ships. 1940. 245f photos, drawings Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $9.00, Enlargement Print $32.50. PB 109729

Aircraft rescue boat contract N140s-85224.
1. Engines, Marine - Maintenance and repair 2. Defender (Engine) 3. Micro NAVSHIPS D-6988.

Method for converting the British C_0 coefficient based on the Froude "O" values to a C_0 coefficient based on the Schoenherr formula, by Morton Gertler. Second edition. U. S. David W. Taylor Model Basin, Washington, D. C. Jun 1949. 7p graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.25, Photostat $1.25. PB 108855

1. British circle coefficients - Comparative resistance data 2. Froude principle (Vibration of floats) 3. Schoenherr frictional-resistance formula (Ship displacement) 4. Mathematical equations and solutions 5. Ship models - Tests 6. Ships, Cargo - Tests 7. Model basins - Tests 8. Hulls - Friction resistance 9. Ships, Cargo - Displacement - Calculations 10. DWTMB 657 2nd ed.

Molding and casting technique for lightweight anchors, by H. F. Bishop. U. S. Naval Research Laboratory. Mar 1944. 17p photos Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 109282

A detailed description of the molding and casting technique for making thirty, fifty and seventy-five pound lightweight, high holding power, anchors of a new design is given. NRL M-2255.

Neue stevenrohr abdichtung für see-und flusschiffe (New stern tube packing for sea-going ships and river boats), by F. Sass. Translated by F. Rizzo. Dec 1952. 19p drawings Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $1.75, Photostat $2.50. PB 108588

From Konstruktion, jahrg 2, hft. 11, 1950, p. 321-325.
1. Packing materials - Germany 2. Ships - Stern tubes - Packing - Germany 3. NAVSHIPS T506.

Scale model test of high-temperature high-pressure steam piping, AV7 class vessel, by Paul Symonds, Eugene Pardue, Irwin Vigness. U. S. Naval Research Laboratory. Feb 1944. 27p photos, draw-

ing, diagrs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109267

End reactions due to thermal expansion have been determined by means of model tests, for the main steam piping in the after machinery room of an AV7 class vessel. The values obtained are compared with those calculated by the Philadelphia Navy Yard. NRL O-2236.

Study of materials for sea markers, by F. E. Brinnick. U. S. Naval Research Laboratory. Nov 1944. 21p photos Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109520

The field of dyes, pigments and dye-pigment mixtures was investigated to find an improved sea marking chemical; and after testing a large number of materials, the "Fluorescein Dye - Soluble Sodium Salt", which is currently used, was found to excel in practically all the desired characteristics. Further research resulted in a new formulation which consists of an aerated flake form of sodium fluorescein dye with greater buoyancy, longer diffusion life and resistance to lumping without any appreciable loss in brilliance or color. Numerous packaging designs and materials were investigated; and a transparent, wide-mouth, easy-opening ethyl cellulose can was evolved, the cap of which serves as an emergency signaling mirror. NRL P-2387.

WATER SUPPLY, SANITATION AND PUBLIC HEALTH

Optics of distilled water and natural water, by E. O. Hulburt. U. S. Naval Research Laboratory. Oct 1943. 27p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109254

The scattering and absorption coefficients throughout the visible spectrum of distilled water, were measured in the laboratory, the Chesapeake Bay and the Atlantic Ocean. NRL H-2210.

Report of the Hydraulics Research Board for the years 1947-1951 with the report of the Director of Hydraulics Research for the years 1948-1951. Gt. Brit. Dept. of Scientific and Industrial Research. Hydraulics Research Board. 1952. 59p photos, diagrs, graphs, fold maps Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.75. PB 108924

S. O. code no. 47-172-0-51.
1. Hydraulics - Research - Gt. Brit.

Rural water supply and sewerage disinfection of rural surface water supplies with chlorine, by J. H. Sorrels and P.J.A. Zeller. Texas. Engineering Experiment Station, College Station, Texas. Dec 1952. 19p drawings, tables Available from Texas Engineering Experiment Station, College Station, Texas. PB 108580

Bulletin 128.
1. Water - Purification 2. Chlorine - Bactericidal action 3. Sewerage - Purification 4. TU EES B 128.

Spreading agents for clearing water surface of oil film, part II, by W. A. Zisman. U. S. Naval Research Laboratory. Jan 1943. 22p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 109232

Date of tests September 1, 1942 - December 15, 1942. This report presents a summary of the developments since the earlier work described in NRL Report no. P-1930 of September 9, 1942 (PB 105919). For pt. I see PB 105919.
1. Wetting agents - Preparation 2. Sea water - Oil removal 3. Water - Purification 4. Glycol - Derivatives - Uses 5. NRL P-1984.

Water supply installations in Japan and South Korea. Summary report, by F. S. Blach. U. S. Geological Survey. Military Geology Branch. Dec 1952. 64p photos, maps, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.00, Photostat $8.75. Limited supply available from Military Geology Branch, U. S. Geological Survey, Washington 25, D. C. PB 108911

1. Water supply - Japan 2. Water supply - Korea 3. Waterworks - Japan.

MISCELLANEOUS

Agricultural advisory services in European countries, report of a working party of experts. Organisation for European Economic Co-operation, Paris. 1950. 223p tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $.50. PB 110635

1. Agricultural engineering - Economic effects - Europe 2. Agricultural research - Europe 3. Agricultural experiment stations - Europe.

Agricultural extension services in the USA. Organisation for European Economic Co-operation, Paris. 1951. 195p diagrs, maps (1 col. fold), tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $3.00. PB 110629

Report of a working party of European experts. AG/T(51)4.
1. Agricultural economics 2. Agricultural engineering 3. Agricultural experiment stations 4. Agricultural research.

Annual report on scientific and industrial research and technological advance, Federal Republic of Germany and western sectors of Berlin, 1952. U. S. High Commission for Germany. Mar 1953. 214p Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.00. PB 111165

Despatch no. 2927.
1. Industrial research - Germany 2. Scientific research - Germany.

Case study data on productivity and factory performance: Dry electrolytic capacitors. (Based on reports submitted by four selected plants). U. S. Bureau of Labor Statistics. Mar 1953. 75p photos, diagrs, graphs, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 110453

Prepared for the Mutual Security Agency, Productivity and Technical Assistance Division.
1. Capacitors, Electrolytic - Production 2. BLS R 15.

Case study data on productivity and factory performance: Power laundries. (Based on reports submitted by 9 selected laundries). U. S. Bureau of Labor Statistics. Dec 1951. 68p photos, diagrs, tables Available from U. S. Dept. of Labor, Bureau of Labor Statistics, Washington 25, D. C. PB 109988

Prepared for Mutual Security Agency, Productivity and Technical Assistance Division.
1. Laundries - Production.

Cold chain in the U.S.A. Report of a group of European experts, part I. Organisation for European Economic Co-operation, Paris. Aug 1951. 71p map, tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $1.50. PB 110623

Contents: Appendix I: Temperature and relative humidity. A. Europe B: United States. - Appendix II: Table 1: National income in 1949 per capita. Table 2: Average family budget. - Table 3: Comparison of purchasing power (prices). - Table 4: Comparison of purchasing power (work hours).
1. Refrigeration - Methods 2. Refrigeration engineering 3. OEEC TAR 17.

Control of livestock diseases in European countries. Organisation for European Economic Co-operation, Paris. 1952. 74p tables Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $1.25. PB 110633

Technical Assistance Mission no. 63. Chairman: Thomas Dalling. Annexes: A: Principal livestock diseases in member countries. - B: Prevalence of disease in individual countries. - C: Organisation of country veterinary services; special schemes for animal disease control; and methods of control for specific diseases. - D: Insurance, compensation and the disposal of dead animals. - E: Statistics of domestic animals in participating countries (1950). - F: Consumption per capita of meat and animal food products in participating countries. - G: Members of the working party.
1. Livestock - Diseases - Europe 2. Livestock - Statistics - Europe 3. Medicine, Veterinary - Europe 4. OEEC TAR 63.

Cost accounting and productivity, the use and practice of cost accounting in the U.S.A. Report by a group of European experts. Organisation for European Economic Co-operation, Paris. 1952. 116p graphs, tables (1 fold) Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $.25. PB 110616

Technical assistance mission no. 50.
1. Management, Administrative 2. Cost accounting 3. Accounting - Methods 4. Inventories 5. Business management 6. OEEC TAR 50.

Documentation techniques in the U.S.A.: Selection, reproduction, dissemination. Report of a group of European experts. Organisation for European Economic Co-operation, Paris. 1951. 50p Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $1.25. PB 110615

ST(51)8.
1. Documentation 2. Technical research 3. Reports, Technical.

Experimental investigation of the behavior of soil under a punch or footing, by W. Sylwestrowicz. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Jan 1953. 23p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.00, Photostat $3.75. PB 108982

Contract N7onr-35801, T. O. I, NR-041-032.
1. Soil mechanics 2. Soils (Engineering) - Pressure 3. GDAM A11-79/23 4. GDAM TR79.

Hotel industry in the USA, report of a group of European experts. Organisation for European Economic Co-operation, Paris. 1951. 62p table Available from Columbia University Press, 2960 Broadway, New York 27, N. Y. $.75. PB 110618

1. Hotels - Management.

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Using heated K_2O_4 as CO_2 absorbent a number of breathing tests were performed with the object of improving canister design. Distributor type canisters were developed both for substitution in the present High Altitude Rebreathing Apparatus and for use with a more nearly ultimate rebreather. NRL P-2153.

Papers and list of delegates. International Symposium on the Organization of Scientific and Industrial Research, London, 1951. Nov 1951. 102p diagrs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.25. PB 111157

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penditure on, and evaluation of results of industrial research, by Wallace Akers. - Application of Science in the small firm, by Alexander King. - Information service and the contact organization of the Royal Swedish Academy of Engineering Sciences, Stockholm, by Edy Velander.
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1. Mechanical engineering - Research - Gt. Brit.

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1. Quality control 2. Quality control - Charts 3. Sampling 4. Statistical methods.

Study of the subsurface method of application of foam for the extinguishment of fuel oil tank fires, by H. B. Peterson and R. S. Ericson, Jr. U. S. Naval Research Laboratory. Nov 1943. 59p photos, drawings, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $2.75, Photostat $7.50. PB 109328

Results are given concerning the analyses by Laboratory methods of this fundamentally new oil fire extinguishment procedure initially developed in Great Britain. Theoretical and small scale findings are substantiated by a full-scale oil tank fire test. Evidence is presented establishing the extinguishment operation as being largely a function of the cooling by the water in the foam rather than a smothering action. NRL P-2182.

Survey of agricultural, forestry and fishery products in the United Kingdom and their utilization, by A. B. Stewart and F. N. Woodward. Gt. Brit. Development Commission. Jun 1951. 146p fold maps, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.70. PB 109715

S. O. code no. 88-201.
1. Farm produce - Gt. Brit. 2. Fishing industry - Gt. Brit. 3. Forest products - Gt. Brit.

Survey of production scheduling and control systems, by Paul E. Panson. Jun 1950. 75p fold diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm $3.50, Photostat $10.00. PB 109768

The report deals largely with the presentation of the actual systems of several companies but briefly with the comparison between these systems and the theoretical matter taught in the classroom on this subject. The problems and the methods of solution are outlined, and analyses of production scheduling and control procedures were made. Flow charts of the various companies are included. Thesis-Rensselaer Polytechnic Institute.

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